



Mixed Reality Sand Table

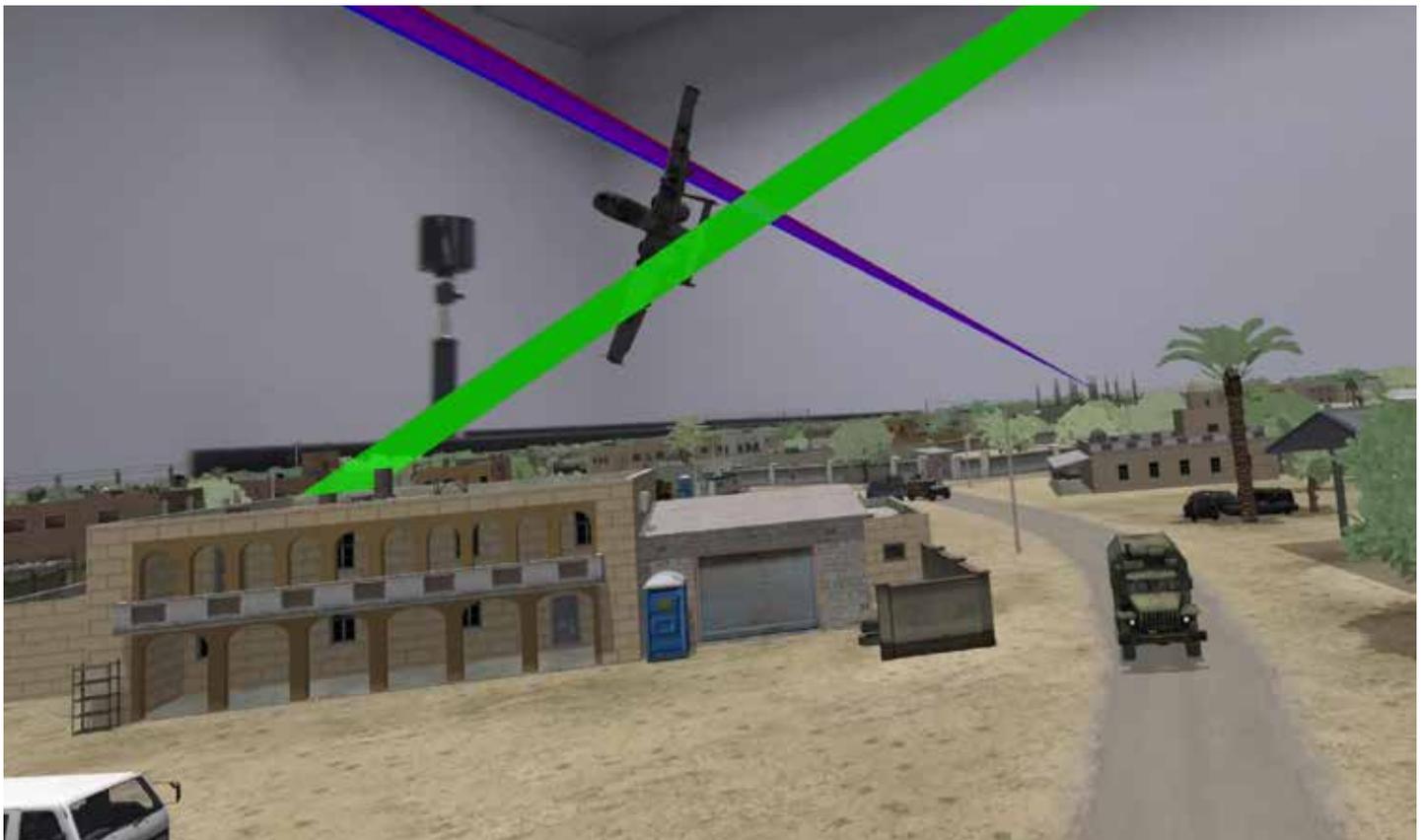
The MVRsimulation mixed reality Sand Table enables commanders, instructors, trainees, and students to collaborate interactively to plan and review training missions in a shared, mixed reality setting. Users view the virtual world on a 3D visualized 'table' in MVRsimulation's Virtual Reality Scene Generator® (VRSG®). Users can plan, enact, and review training scenarios while directly interacting with cultural objects in VRSG or by the use of any DIS-based Semi-Automated Forces (SAF) commercial or government off-the-shelf (GOTS) software.

Mixed Reality Immersion

Users are immersed in the virtual sand table via the use of Varjo mixed reality headsets. The Varjo headsets provide the mixed reality environment that enables the wearer to freely explore the 3D visualization of the scenario and geospecific 3D terrain and provides a real-world pass through for interaction

with other users in the virtual world as well as interacting with real-world systems to control the scenario, work with physical emulated military equipment, and operate simulated military training packages such as ATAK via the Special Warfare Assault Kit (SWAK). All of this is done without the need to remove the headset. An instructor can communicate directly with a student in the mixed-reality sand table while streaming the visuals of both users to an external monitor for classroom instruction. The instructor stays immersed in the sand table while also being able to see the other students in the classroom past the edge of the virtual sand table.

Each user has a Valve Index Controller to control direct interaction within the sand table. The controllers enable each user to independently traverse the terrain to evaluate specific views of the 3D virtual world. Users can zoom in and out with the controllers



First person student view from inside the Varjo XR-3 headset of densely populated Hajin, Syria, terrain in MVRsimulation's mixed reality Sand Table. The scene is rendered by MVRsimulation's Virtual Reality Scene Generator (VRSG). The red and blue cones depict the JTAC trainee's eye gaze from the Observer Station in the Deployable Joint Fires Trainer (DJFT). The green beam is a pointer from the instructor who is collaborating with the student in the virtual sand table.

to give them unique vantage points from close up evaluation of a single entity to a top-down view of the entire battlefield. The Valve Index Controllers also provide a virtual pointer used to point to specific elements in mission planning or AAR and to direct the student's view to a particular location.

User Collaboration

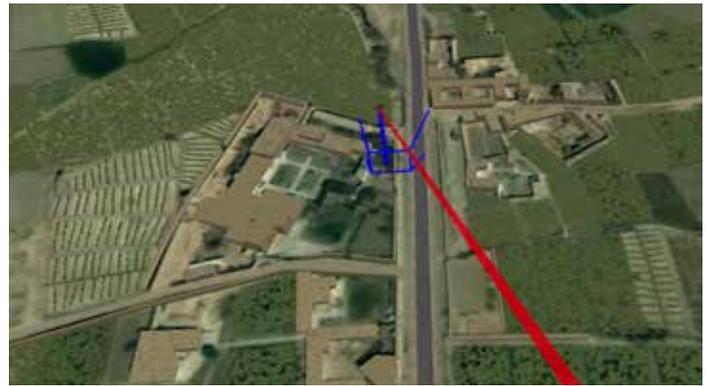
During Sand Table use, the participant's eye gaze is depicted as a colored frustum enabling each user to see the direction of view of the other participant. The colored frustum is valuable for student training as it enables the instructor to verify in real-time if the student is looking at the correct location or entity. Other Varjo headsets connected to the DIS-based network can output their eye-gaze tracking from VRSG. Eye-gaze tracking in AAR is critical to verify what the student was looking at. This ability removes an ambiguity for what the student says they were looking at since the instructor can clearly see what the student was viewing.

The network and LVC-ready Sand Table can be used as a stand-alone training and evaluation asset. It can also be integrated with any DIS-based training simulator such as MVRsimulation's Deployable Joint Fires Trainer (DJFT) or Part Task Mission Trainer (PTMT). VRSG listens for DIS entities on the network and displays them as 3D models in the virtual sand table. DIS recording capabilities facilitate recording and playback of training sessions. During playback the instructor has control of the recording enabling them to pause the recording for all users to evaluate the full 3D virtual world including the geospecific terrain, 3D entities, line of sight, and student eye gaze.

Training and Mission Planning Applications

The Sand Table is a multi-purpose tool designed to fulfill a number of training requirements, including:

- **Mission Planning/Rehearsal:** Prior to carrying out a training mission in a simulator such as the DJFT or PTMT, trainees can meet with their training counterparts and instructor to plan the mission, watch a run-through of the scenario, and make adjustments to the mission as required.
- **Stand-alone classroom training:** In classroom settings, the Sand Table provides a critical learning tool for students and instructors to engage in mission planning and rehearsal to train for tactics and strategic decision making. Students see the results of their decisions in real-time and gain immediate feedback from the instructor. Other students in the room can watch the view of the headsets projected onto screens while the instructor and student discuss their tactics.
- **Real-world mission planning:** A mixed-reality replacement for current mission planning methods in theatre, the Sand Table enables users to rehearse actual mission plans, giving all parties a crystal-clear understanding of how to complete the mission most effectively. When connected with a DIS-based SAF, users can also implement the mission from their planning to evaluate the success of the mission objectives.
- **After Action Review:** Following simulation training missions in networked simulators, students and instructors can review a DIS stream playback, enabling them to experience the mission from all angles, review critical outcomes, and deepen learning opportunities. AAR of the trainee's recorded eye-gaze log also enables students and instructors to understand where the trainee was looking throughout the mission, giving insight on whether critical cues or incidents were missed.



The instructor and student collaborate in the virtual sand table. Here the instructor is pointing (red beam) at a tank and can verify the student is looking at the tank as depicted by the blue frustum.



Student ground level, zoomed-in view inside the Varjo XR-3 of a virtual sand table scene displaying DIS-based entities, the JTAC trainee's eye gaze (red and blue cone) and the instructor's view (green frustum).



Instructor view of the 3D virtual terrain of Afghanistan in the mixed reality sand table. The student is seen here in the real-world view just beyond the edge of the virtual sand table with correlated blue frustum displaying the current view of the student. The instructor is pointing to a helicopter flying in the scene with the Valve Index Controller and red pointer beam.

For more information about purchasing an MVRsimulation Mixed Reality Sand Table, please send a request for a quote to sales@mvrsimulation.com.

