ready2train™

VIRTUAL REALITY DISMOUNTED SOLDIER SIMULATOR

The **ready2train**™ integrated hardware suite provides an infrastructure for a true, fully immersive individual and small group, Squad/Platoon, team training and rehearsal virtual experience, enabling Soldiers & Leaders to rehearse tactics, techniques, procedures and practical leadership in a Virtual Situation Training Exercise (VSTX) all while using natural human motion, and reinforcing skills requiring muscle memory.

- Full immersion is achieved with a Virtual Reality/Mixed Reality simulator (both real and virtual assets)

- Wireless Helmet Mounted Displays in High Definition and wide field of view

- Untethered movement and short distance locomotion (dependent on tracking volume selected)

- Body and hand tracking translate position data to virtual avatar in real time

 - Patented Weapon Instrumentation "skins" coupled with a variety of safe recoil options enable the use of real weapons in the simulator with full operational capability and data capture

- Soldiers train in their actual gear

- Portable and easy to set up

- Reconfigurable student training space enables individual tracking/virtual networking or group tracking in one common physical area

- Ability to integrate into the Live, Virtual and Constructive (LVC) training environment.

- Agnostic to common game engines (VBS, Unreal, Unity, others) to enable customized scenarios to meet all training requirements

- Untethered movement and locomotion. Unrestricted movement, and use of 100% real   gear (no back pack computers). Optical tracking, wireless devices, wireless HMDs

- Portable and deployable. Systems are collapsible and are one or two man carries. Can be configured to operate in any indoor location of any size. Outdoor configurations also available.

- Scalable. Supports individual or team training of 15 or more soldiers simultaneously. Pre-configured, daisy chained camera towers <u>can be quickly</u> <u>configured for team tracking in a common physical area, or individual tracking in separate tracking spaces with virtual networking</u> (which enables unlimited terrain in a confined physical training space).

- Unlimited variability or size of the physical training space from 10x10 feet upward.

The best Mixed Reality Squad Training System in the world

- Ease of set up and use. Simple, mistake-proof wiring and connectors, rapid calibration (system calibration in 10 minutes per day, individual trainee calibration in 10 seconds)

- 360 degree views in every direction using untethered wireless head mounted displays with patented zero frame latency wireless video.

- Software Agnostic - ready2train is a hardware suite that easily operates in any game based simulation including VBS3, Unity, Unreal and others.
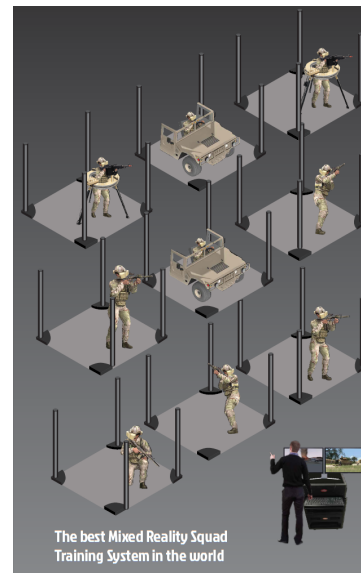
- Expandability – ready2train operates as a Close Combat Simulator, but can be expanded to incorporate Use of Force Training by inclusion of wireless Taser, OC Sprayers, Flashlights etc.

- Can be integrated with other game/simulation engines and tracking systems.

Portable

An ultra-portable and deployable system, **ready2train**™ can operate inside its ruggedized shipping cases, eliminating much packing and unpacking. Setup takes less than 15 minutes per training space.

ready2train™ requires very little body instrumentation. For passive reflective tracking, in a few seconds trainees attach small, featherweight, 2D or 3D markers that do not interfere with training activities or body movements. Markers are attached to the back (using their issue protective MOLLE vest, or a provided training vest), upper arms (using elastic Velcro straps), hands (using Velcro to a glove), waist (using adjustable belt) and crown of the helmet or head. Trainees can execute complete combat rolls, crawl, go prone, jump, lean, twist etc., with all their body/weapon movement tracked in submillimeter accuracy.

For Active LED tracking (which permits simultaneous tracking in a common physical space), trainees attach pre-configured LED markers to the same areas above. The LED markers are self-contained, battery driven, active LED lights in the IR spectrum. Serious Simulations will design ergonomic and small enclosures for the printed circuit board, battery, and lights, rather than the pre-configured, bulky, "pucks" offered by a typical COTS purchase (pictured at right).

Scalable

The system is easily scalable with many variations:

- Individual to squad or larger size groups

- Simulated vehicles enhance tactile realism of mounted operations

- Stand-alone use, locally networked with other simulators, or distributed via DIS/HLA

- Camera-based system tracks trainees' natural body motions.
    - o Two optical tracking systems can be employed singly or in combination:
        - Passive Reflective system – individual tracking using reflective tape
        - Active LED system – battery powered markers are tracked instead of reflective tape to provide tracking of multiple users in the same space

- o Each trainee is monitored by eight or more networked optical tracking cameras
    - Cameras provide individual or group tracking
    - 100 frames per second
    - USB 2.0 interface
    - Infrared LED illumination of the scene
    - 6 degrees of freedom tracking of the head, upper body, weapon
    - Hand, arm, and finger tracking support Infantry Hand/Arm signals
    - Sub-millimeter accuracy
- o Trainees move completely freely within the camera-monitored training space. Walk, run, jump, roll, prone, kneel, crouch, lean, and stand are all supported movements.

- o Trainee's primary locomotion is natural human motion.

o Trainees can operate a wireless, picatinny rail mounted, ergonomic thumbstick controller to move their simulated avatar great distances beyond the physical boundaries of the camera-monitored training space. Physical movement overrides the thumbstick for any human motion while in the thumbstick mode (such as react to direct or indirect fire

o Thumbstick controllers also have 5 additional button presses to accommodate menu interactions when needed.

o Wired (to weapon skin with radio) and wireless (integrated 900 MHz radio) thumbstick/action button devices are available

o Other locomotion devices can easily integrate with ready2train, including omni-directional treadmills, foot pads, or utilizing lower body tracking of leg movements to stimulate virtual walking/running

Real weapon mounted Thumbstick Controller with ergonomic adjustor

Natural positioning for interfacing Thumbstick and menu buttons for a variety of thumb sizes

- **ready2train™** currently uses OptiTrack's "Motive" software to process camera images in real time and delivers data to Serious Simulations Inverse Kinematic software suite for processing and avatar animations and uniquely accomplishes this without tracking lower body movements (to improve processing efficiency and eliminate latency) Other tracking hardware/TSS software packages can also be integrated with the Inverse Kinematic software suite.

  o Cameras track the position of reflective or active LED markers
    - Markers attach to and detach from trainees quickly via Velcro bands, Molle type hooks and waist belt. A crown attaches to the helmet for head tracking
    - Serious Simulations' innovative use of 2D reflective markers allow trainees to wear their full duty uniform and equipment
    - Serious Simulations' custom designs for active LED markers reduce their bulk and improve form and fit in the simulator
    - Markers are worn without interfering with trainee's natural body motions

- o Cameras are mounted on telescoping "towers"
  - Towers extend and retract easily by hand, to preset tower height settings, for portable use and easy shipment
  - o Towers have weighted bases for stability
  - o Towers currently are of two physical designs:
    - o Ruggedized plastics with internal cabling and electronics
    - o Lightweight PVC plastic with internal cabling and external hubs and breakout boxes. This configuration is much smaller and further improves deployability and transportability.

  - o Cabling solutions.
    - Serious Simulations replaces COTS camera cabling intended for use in fixed MOCAP facilities with custom cables and printed circuit board hubs and breakout boxes
    - 50% reduction in cabling
    - Increased speed and simplicity of set up
    - Mistake proof cabling

- **Software**
  - o Agnostic. Any 3D game engine can be used such as VBS3, Unreal 3, Unity and others
  - o OptiTrack "Motive" software processes motion capture camera images in real time
  - o Serious Simulations Inverse kinematic plug-in module for VBS3 adds real time high-fidelity human motion to VBS3 avatars without affecting latency or performance
  - o Serious Simulations software converts motion-capture data to natural human body movements for VBS3 character (avatar)
  - o Serious Simulations software monitors operation of the trainee's weapon and blends weapon actions into the 3D visuals of VBS3
  - o Serious Simulations software integrates the operation of the trainee's weapon with visible and audible actions in the game engine, including weapon firing that stimulates real time visualization and sound
  - o Serious Simulations software can provide sensory feedback to the trainee in response to virtual bullet impact or other damage inflicted in the training scenario, using a wireless vibration/audio, and light responding device fitted to pockets of the trainee.
  - o Serious Simulations software integrates the true position and pointing (aiming) direction of the trainee's weapon to cause accurate impacts of bullets fired, thereby causing the game engine to display impacts at the correct location in the training scenario's virtual world and causing accurate, realistic damage to impacted persons (avatars) and other objects in the virtual scenario.
  - o Windows 7 or Windows 10 operating system required

Body and tracking translates position data to virtual avatar in real time

- **Hardware**
    - o Rack mounted, cost effective computers (1 each per individual training space) Portable ruggedized racks for easy shipment of the ready2train system
    - o Ruggedized mounting of computers in tracking areas and for the Instructor/Operator are provided (IOS pictured at left)