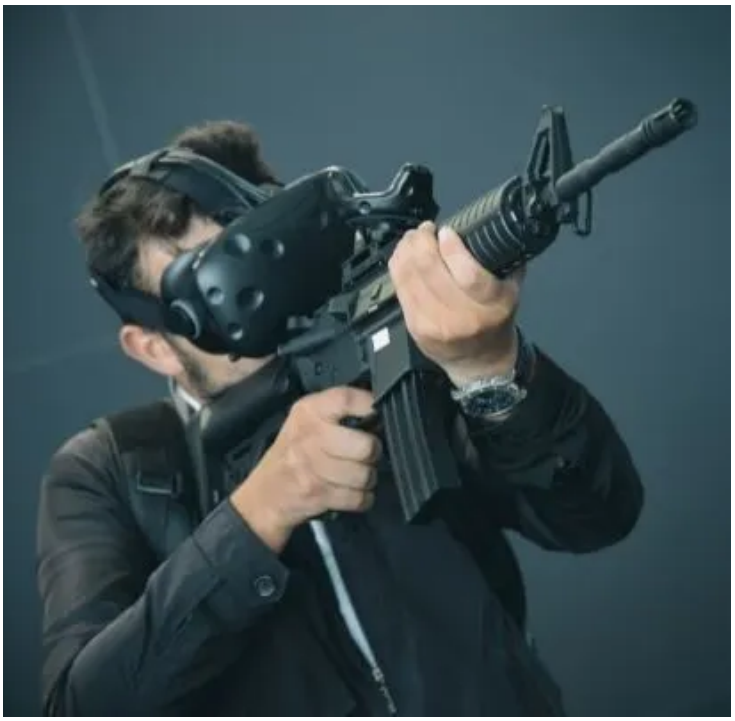


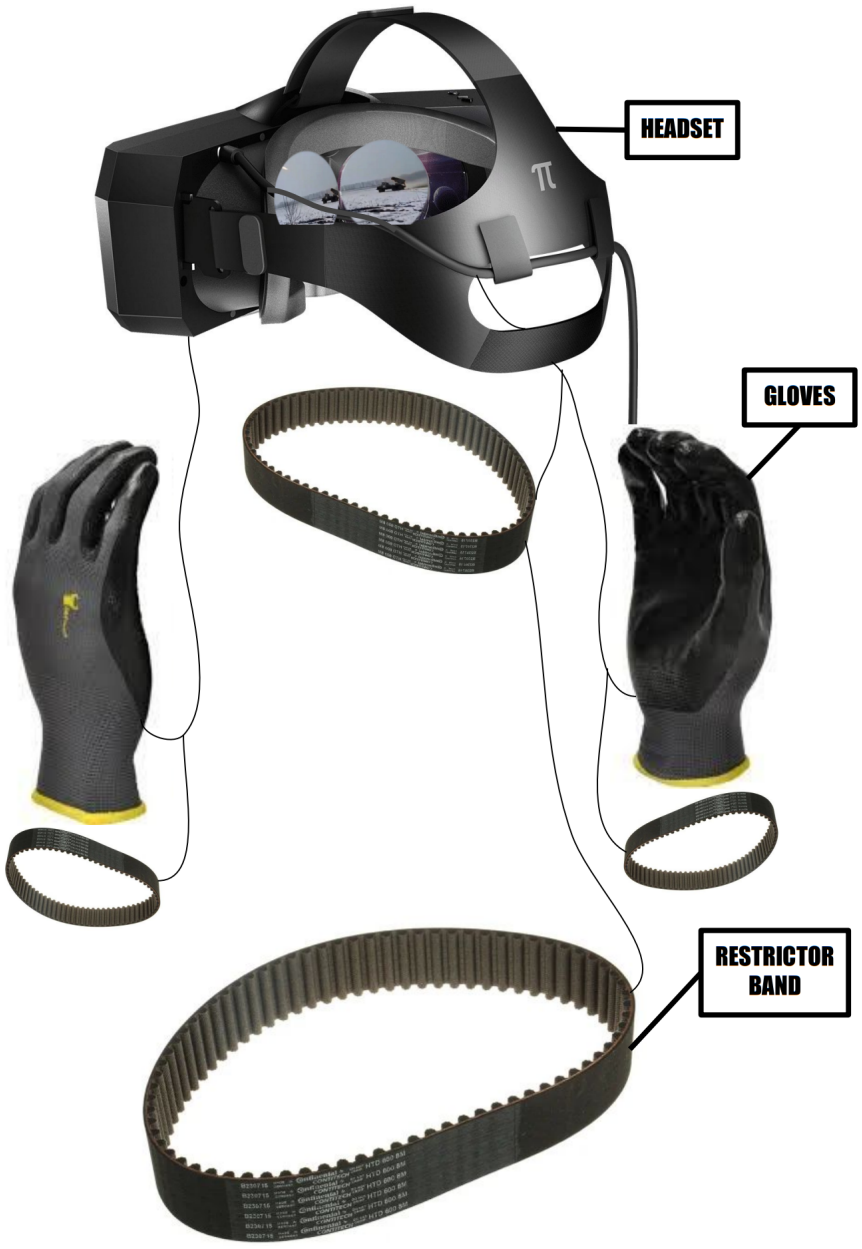
Virtual Trauma Simulator

Will Sayler

Overview

The “Virtual Trauma Simulator” (VTS) is an advanced virtual reality system with class-leading realism and immersion, allowing professionals to perceive danger and become used to it before risking their lives. With the general peacefulness of today’s world, there’s little need for the general population to engage in this sort of simulation. Nevertheless, as long as danger exists, society needs skilled protectors. These protectors deserve the best possible training, not only to improve the safety of those they protect, but for their own mental health. PTSD generally occurs in a person’s first traumatic situation. Easing a professional into their career is the best way to protect them as well. Official modules are currently available for a variety of first responders and

military personnel. Existing modules use three-dimensional scans of real locations and people in action as well as open-source codecs to create as real of an experience as possible. Modules available for sale include urban and rural infantry combat in several nations, flight simulation for F-14A, F-15C, F-16C, F-18C and E, F-22, and F-35A, B, and C. Non-combat modules also include several possible emergencies in a variety of settings in the United States (export models are currently in development) including wilderness emergencies set in the Aleutian Islands, building collapses in several major cities, and a variety of car crash situations. Assets from any of these modules can be combined to create unique situations such as placing foreign soldiers in American maps to simulate a homeland defense situation.



Hardware

The stock configuration offers three components, with additional accessories available for various special applications. These are a headset, which provides two 8k OLED displays through lenses calibrated automatically for user IPD. With 1000 nits

peak brightness focused through lenses, These can display deep blacks, blindingly bright whites, and the full sRGB gamut at 240 Hz.

VTS gloves offer unparalleled hand feel. Electronically tightened fibers can resist the hand’s flexion, recreating the feeling of hard surfaces, and the roughness and temperature of the gloves can be regulated as well, offering a feeling many users have described as indistinguishable from feelings like touching concrete or immersing the hand in water.

Restrictor bands have variable elasticity, and weigh no more than half a kilogram, making them almost unnoticeable until they are tightened, at which point they can apply up to 5000 Newtons of force to restricted parts of the user’s body. Splicing these is acceptable. All VTS modules can function wirelessly, though extremely high screen brightness or tension in accessories may require wires for additional power. All of these components can be connected via lightweight POE ethernet cables.

Software allows multiple users to participate in modules simultaneously, including at different levels of immersion.

Immersion Levels

The chief advantage of VTS over conventional simulation alternatives is its ability to immerse trainees at a variety of realism levels. Trainees are expected to begin training at the lowest level. Here, motion-captured actors appear fully animated, and few accessories are expected to be used aside from speakers (at lowered volume) and gloves. This can allow trainees to practice theory in a low risk environment. VTS gloves offer physical resistance even in this mode, but surface replication and temperature control are disabled for a more obviously simulated situation. While value at this level is minimal for military applications, pre-release testing has indicated that scenario training can be invaluable for emergency services personnel including paramedics and law enforcement.

Level two immersion replaces animated assets with photo realistic ones. At this point, speaker volume can also be raised. This has been demonstrated to have substantial value in army applications, especially infantry and light vehicle uses. While still much less traumatic than higher levels of realism, Hyper-realistic auditory response has decreased adverse reactions to life-fire training. Furthermore, extensive research

has proven that shooting targets doesn’t fully ingrain the ability of soldiers to pull the trigger. Photo realistic moving targets can dramatically improve marksmanship statistics in deployed soldiers.

VTS offers a dramatic hardware upgrade relative to other solutions at levels three and four. For level three immersion, restrictor bands are added to the body to simulate physical impacts on the body. For pilots this is especially valuable with throat and/or diaphragm restrictors. Flight instructors often bemoan simulators’ inability to simulate the physical impacts of high G maneuvers. While VTS can’t replicate extended high G’s, restrictor bands can cut off breathing and circulation to the head, potentially inducing blackout or nearly so. At this level, it's also natural to add in the gloves’ full effect, making touch sensations completely realistic. Several testers have reported being unable to distinguish from reality at this level. However, serious risks begin to present themselves here. Emergency shutoff should be monitored at all times, as malfunctioning devices have the potential to cause permanent injury. In particularly traumatic modules, those who begin on level three have shown signs of PTSD. Where possible, trainees

without real-world experience should begin no higher than level two.

Level four immersion should only be used for mission-specific training. Injectors of various drugs can be installed in restrictor bands. Adrenaline is the tamest of these, and can artificially heighten perception of danger, causing many to completely forget their real-world surroundings in intense moments. Benzodiazepines can induce short-term amnesia, causing trainees to forget beginning the simulation, and various pain-inducing drugs can simulate many injuries. Localized pain is most commonly used, usually for bullet wounds or shrapnel. Simultaneous constriction of many bands can also be used for shockwaves, and, when combined with numbing agents, is the nearest simulator available for high G’s.

RECOMMENDED USE CASES

MEDICAL

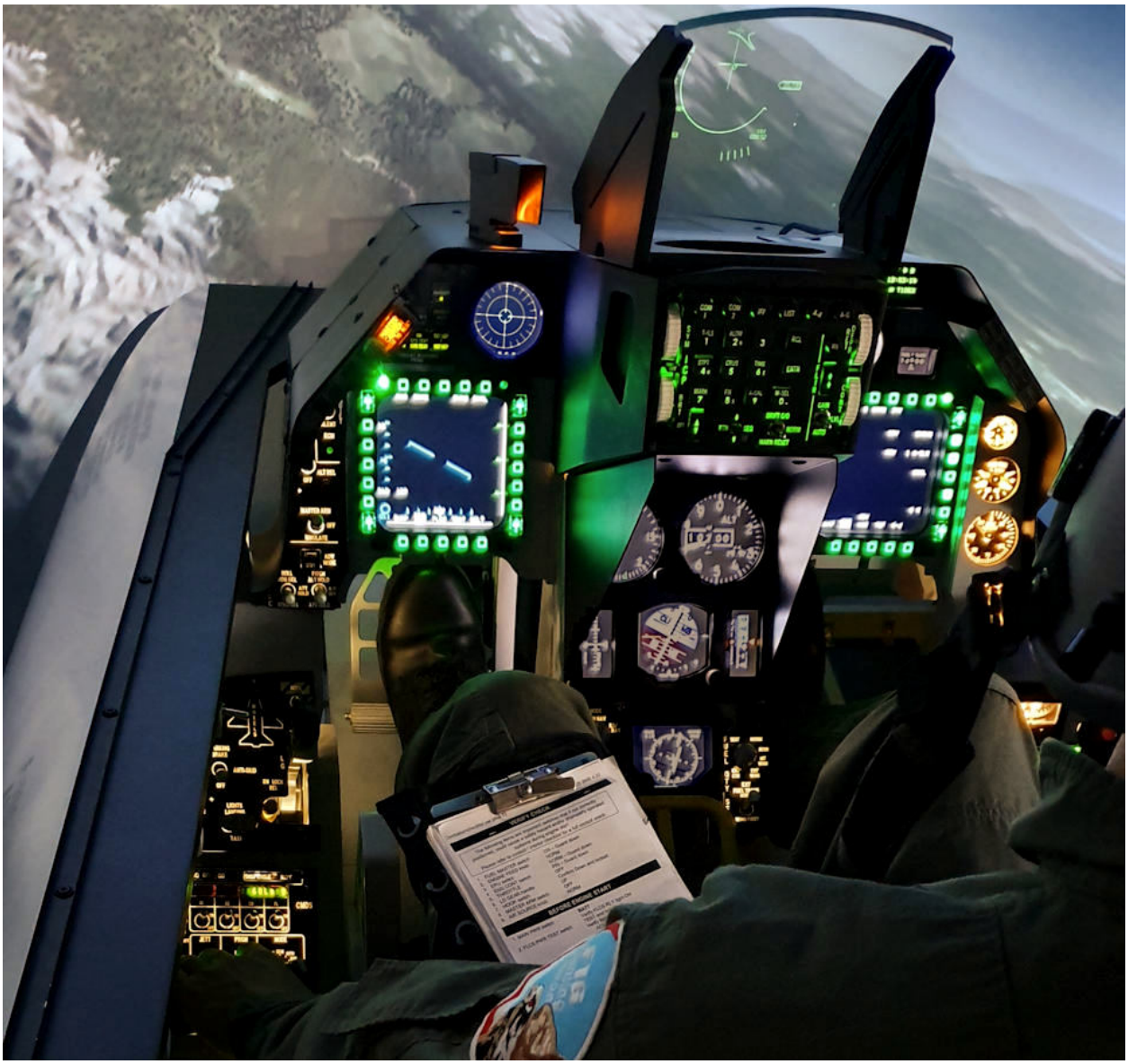
For EMTs in training, beginning at immersion level one is recommended, stepping up only to level three. Working with a high degree of precision under pressure is important, and it can be jarring to immediately begin with photo realistic visuals. Increasing realism in the gloves but not other parts of the experience can help to enhance the training aspect.

LAW ENFORCEMENT

With non-combat law enforcement, level two is the only recommended level of training. This is most beneficial for situation training, allowing officers to work on making rational decisions in high-pressure scenarios.

MILITARY

Most military personnel should begin with level one simulation and move up to level three. All levels of simulation should include restrictor bands to simulate firearm recoil. Level four is only necessary for special operations personnel who may be expected to complete missions despite injuries and potentially without medical attention. Military simulators are available



with a variety of simulation components including replica firearms and “simpits” to replicate the cockpits of various vehicles. These replicas are included in the device’s recognition of what parts of the real world to display through augmented reality.

Use discretion with all other personnel. Further guidance is available with each individual module.

VTS is intended only for professionals expected to engage in dangerous or potentially traumatic activities. As VTS and its component technologies become available for international export and private purchase, additional modules, including options for risky private behaviors such as dangerous driving may become popular. The VTS team therefore recommends strongly that users consider that real-world applications of these modules can result in death and that no level of training can prevent all eventualities. Virtual Trauma Simulator is not responsible for any injury sustained attempting to replicate events in VTS modules.