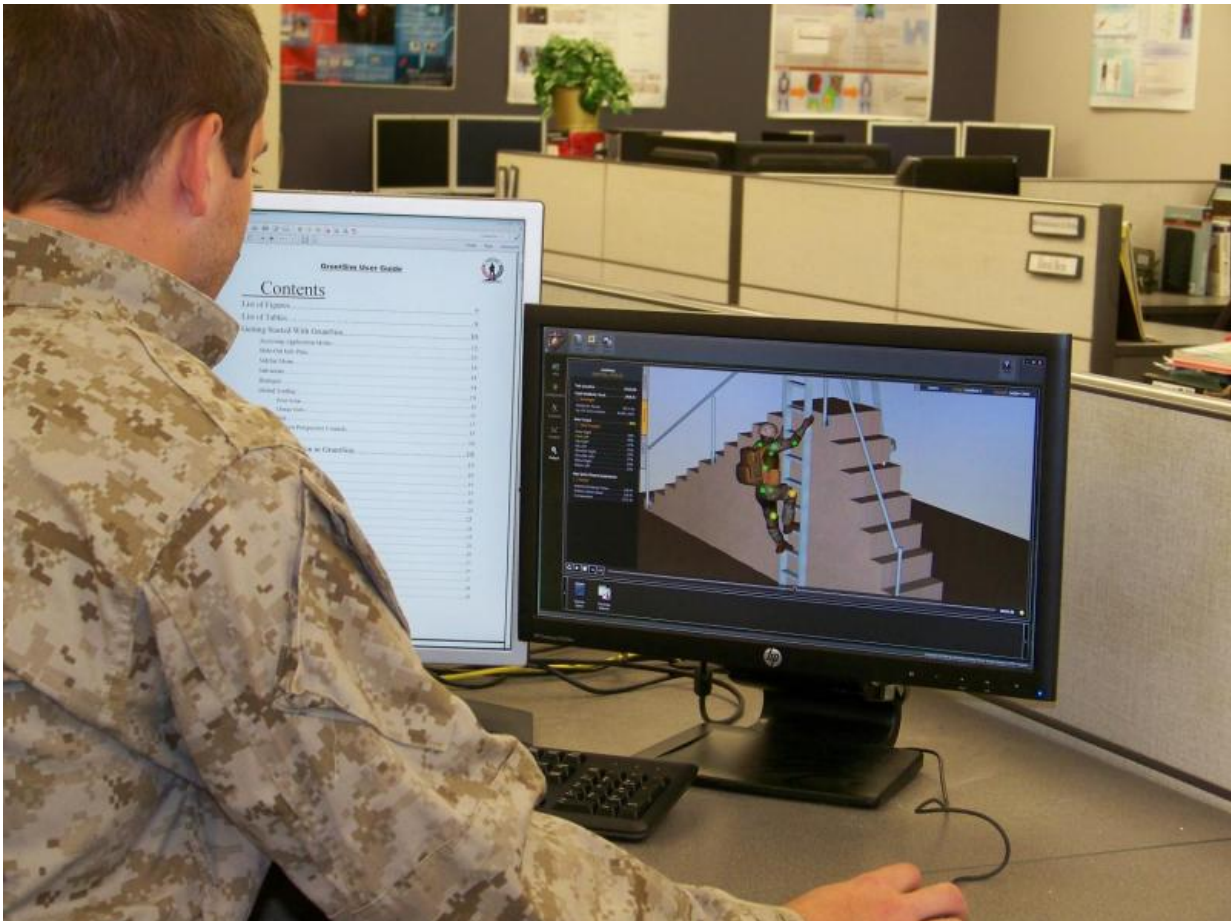


Building a better grunt—New technology to lighten marines' loads

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A Marine tests the ETOWL, a 3-D computer simulation program geared toward lightening warfighter equipment loads. (Photo courtesy of the University of Iowa.) Credit: University of Iowa

Modern-day warfighters face heavy—literally—odds on the battlefield, as they often carry more than 100 pounds of gear, including body armor, weapons and night-vision technology. Such loads can slow them down, reduce agility and result in fatigue, joint sprains or long-term ailments like arthritis or chronic back problems.

To remedy this, the Office of Naval Research (ONR) has presented the Marine Corps with a 3-D computer simulation program that measures equipment weight, distribution and effects on body mechanics and individual warfighter performance.

The program—called ETOWL (Enhanced Technologies for Optimization of Warfighter Load)—and its companion software are being delivered to the Gruntworks Marine Expeditionary Rifle Squad, which focuses on individual mobility. Gruntworks serves as a 'workshop' to test existing and emerging equipment that would help infantry Marines. Once given to the Marine Corps, ETOWL will be renamed GruntSim.

'ETOWL fits perfectly within ONR's mission to develop groundbreaking technologies that enhance the resilience, physical superiority and overall warfighting performance of U.S. Marines,' said Vice Chief of Naval Research Brig. Gen. Kevin Killea.

ETOWL calls to mind popular combat-themed video games such as 'Call of Duty.' Users can create a Marine avatar, load it with as much or as little equipment as desired and run it through a virtual obstacle course featuring different warfighting scenarios.

Using a color-coded system, ETOWL measures the stress placed on each avatar's joints as well as its balance, flexibility and center of gravity. Green is good and red is dangerous. The 3-D [simulation program](#) features seven different male and female Marine Corps body types.

The benefits of ETOWL are numerous, said ONR program manager Dr. Peter Squire. For example, the Marine Corps can use data from the virtual tests to quickly design real-world prototypes for testing by live Marines. Squire believes this will prevent future injuries and reduce the time and financial cost of unnecessary field trials. In addition, military vehicle manufacturers can improve their product designs to enable Marines to fit better in seats and through escape hatches.

'It's very exciting to see ETOWL transition from ONR prototype to a technology that will enhance human load and performance for the Marine Corps,' said Squire, who works in ONR's Expeditionary Maneuver Warfare and Combating Terrorism department. 'This is the kind of research that's very rewarding because it provides a direct benefit to our nation's warfighters.'

The ETOWL program was developed by the Center for Computer Aided Design at the University of Iowa. Once the future GruntSim is handed off to the Marine Corps, its design software (called the SANTOS human simulation environment) will be made available to the academic community to access free of charge from the center's website.

'This will allow for further research and potential improvement of ETOWL and future programs like it,' said Squire. 'ETOWL has been an important part of ONR's mission because we now have a system to better understand human performance. This is a burgeoning research area that will only become more critical in the future.'

Squire's work aligns with the recently released Naval S&T Strategy, which emphasizes mobility and adaptability within irregular warfare as key components of warfighter performance.

Provided by Office of Naval Research

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