

The Power of

TOUCH

By Nancy
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CurryA MATCHING GRANTS PROGRAM HELPS
CENTRAL FLORIDA SIM RESEARCH STEP INTO
THE NEXT DIMENSION OF VIRTUAL REALITY.

Anyone who's played a video game or ridden a theme park simulator can say they've dabbled in virtual reality — technology that uses digital software and hardware interfaces to simulate “real world” experiences.



But in a laboratory in Orlando, they're going beyond those types of primarily visual and auditory experiences — to a place where you're waiting to *feel* the gunshot blast.

The setting is a test platform at the University of Central Florida's Institute for Simulation & Training (IST): You're standing on a raised platform encircled by a waist-high handrail; a fitted headpiece covers your eyes and nose; a neoprene vest and Velcro bands hold 20 quarter-sized haptic tactors (which register the sensation of touch) fitted snugly against your torso, arms and legs; and a network of wires strung with LED lights run up and down your body to allow a computer to track your movements.

Rather than the laboratory, what you're seeing is a surreal, antiseptic-looking building. You're a soldier on a hallway-clearing mission, working with a partner to make sure the area is free of threats. Haptic cues are used to signal gunshots, collisions and distance

PHOTOS COURTESY OF FLORIDA HIGH TECH CORRIDOR

from walls. You're cued to stay 18 inches from the walls because bullets tend to travel down them, and you're less likely to get hit if you stay clear. You shoot at the enemy, and he fires back. When the shot connects, it's surprisingly mild, a gentle buzzing sensation on your chest.

DEVELOPING TOUCH

There's much more at stake here, though, than simply dodging a virtual bullet. Researchers are recording your every move to determine whether haptic stimulation can increase the effectiveness of simulation training. The ramifications are vast. Haptics has the potential to improve countless training scenarios, from allowing surgeons to practice delicate medical procedures to assisting aviation personnel and drivers of emergency response vehicles.

Despite increasing interest in the technology, there's been little "real world" application or rationale for including haptics in simulation training. Nor is there an industry standard — the ostensible "black box" critical for commercializing technologies — for software that integrates virtual environments with haptic devices. That's where the IST and **CHI Systems, Inc.** come in.

IST researchers are working with CHI, a small, privately owned company headquartered outside of Philadelphia that focuses on supporting people as they work with technology. Nine of its 70 employees are in Orlando, conducting research for the Naval Research Laboratory's (NRL) Virtual Environments and Technologies (VIRTE) project, as well as the U.S. Army's RDECOM group.

The research is intense. IST and CHI personnel have conducted three months of data collection, often requiring 15-hour days. Typically, they run four back-to-back simulation sessions a day, five days a week, maintaining and tweaking the experimental equipment, preparing the participants and monitoring the sessions.

The prototype haptic suit CHI is developing — the Virtual Environment Stimulus Tool, or VEST — is designed for Army first responders handling a Weapons of Mass Destruction incident

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— JENNIFER FOWLKES, PH.D., CHI



and training for medical personnel. The suit, as well as a haptic glove, will be transitioned into commercial products for virtual environment training.

Today, most virtual simulations immerse participants visually, while engaging the other senses in a limited fashion.

"In order for these simulations to become more effective, they need to be more realistic," says IST Research Associate Glenn Martin.

"The ultimate impact will be on effectiveness and efficiency," says Jennifer Fowlkes, Ph.D., a CHI cognitive engineer. "Immersive training enabled with haptics can be more effective than non-haptic training. We may be able to train more tasks, and

we may even be able to reduce the training time."

IST electrical engineer Todd Lazarus designed and built the VEST using commercially available sensors, but the equipment's "brains" are in the Virtual Environment Sandbox Software (V ESS) application developed by the IST.


"V ESS is the foundation rock upon which we build everything," says Martin.

Ultimately, CHI hopes to turn that "rock" into an open standards subcommittee co-sponsored with UCF.

GRANTING ACCESS

The UCF connection to the project was a natural, given the school's expertise in modeling, simulation and computer science. An important piece of the equation is \$60,000 in seed money provided by the **Florida High Tech Corridor Council's (FHTCC)** matching grants research program, which is designed to stimulate entrepreneurial projects and collaboration between the industry and Corridor universities (UCF, the University of South Florida and the University of Florida). Since its inception in 1996, the grants program has funded more than 615 research projects involving 255 companies, for a total investment of more than \$133 million in FHTCC and matching corporate monies.

"The FHTCC grant is allowing the team to incorporate state-of-the-art technology to create a better test platform for us," says Fowlkes. "With earlier technology, there were limitations. The present research gives us the freedom to use more factors and to place them where we want."

That freedom, and the improved research opportunity it represents, will ultimately "leverage a better future for real-world application of haptics," according to Jack Ennis, software engineering team manager for CHI. "If we can create that 'black box', it will be the first instance of an industry standard, and that is the first step." 

WHAT IS THE FHTCC?

The Florida High Tech Corridor Council (FHTCC) attracts, retains and grows high tech industry, and the workforce to support it, within the 23-county Florida High Tech Corridor located in the service areas of University of Central Florida, the University of Florida and the University of South Florida. For more information about the FHTCC, visit www.floridahightech.com.