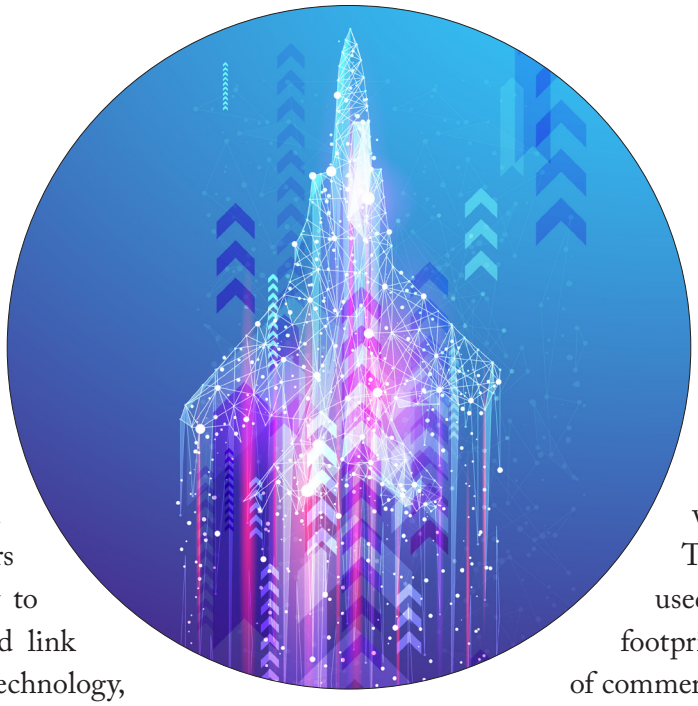
FACE TO INTERFACE

An SBIR-supported innovation in interactive displays finds a broad audience



In the late 1990s, when U.S. Air Force innovators were looking for a way to rapidly create interfaces and link pilots using simulation technology, they likely had no idea that a method arising from a Small Business Innovation Research (SBIR) contract would eventually be used to create the user interfaces found in many of today's automobiles, aircraft, and spacecraft.

The software for the graphic user interface (GUI) developed by a small company in Orlando, Florida, Distributed Simulation Technology, Inc. (or the DiSTI Corporation), following an SBIR solicitation, allowed researchers and operational personnel to create and modify simulator content and hardware, and then permit military flight instructors to virtually interact with their pilots in real time. Today that same software is used across the military, and its footprint is found in a broad array of commercial products.

Early simulation technology was difficult to modify and tailor to training needs, and could only link one pilot to one instructor. As the demand for training grew, the time and expense of one instructor interacting with only one pilot made virtual training expensive and cumbersome.

In 1998, DiSTI offered a solution. Working through two SBIRs in less than two years, the company created a user simulation interface that allowed an instructor to see and interface with the digital instrument displays of four F-16 pilots in a single training session.

Joseph Swinski, President of DiSTI, described

how they created GL Studio, a graphics tool for software developers that automatically hand-coded various behaviors required for programming switches and gauges in GUIs. Using GL Studio, software developers could rapidly reproduce a cockpit display for a user interface, saving significant engineering costs.

"If you had to start from a blank sheet of paper," Swinski explained, "you'd have to hand-code every line to make that switch do all the different things. If there was a behavior problem—how the switch went up and down, or how a knob turned left to right—you would have to write that behavior every time. But inside of our tool, we had all the behaviors you could think of already created, so you could apply that behavior to that switch."

DiSTI's primary accomplishment was to facilitate the rapid creation of the simulator interfaces, controls, and displays in a software link between an instructor operator station and data coming in from pilots. Secondary results have taken the technology across a broad range of commercial endeavors, including creation of infotainment systems, instrument clusters in cars, and touchscreen displays in spacecraft and medical devices.

Winston Bennett, Readiness Product Line Lead for the Air Force Research Laboratory's 711th Human Performance Wing at Wright-Patterson Air Force Base, remembers that the modeling and simulation in the GL Studio took the technology to a new plateau. "We found the software to be unique and very good at rapidly creating the kind of user experience we were looking for," he said.

Bennett categorized GL Studio as "a disruptive technology," saying, "it actually changed the mindset on how we developed human machine interfaces."

What sets the GL Studio apart, Bennett said, is the "fidelity of the interfaces" (or ability to create realistic equipment and system behavior), as well as its flexibility in moving pieces of user interfaces from one place to another. "It creates efficiencies—not only for the company, but for the people who use it," he said. "It is now the graphical interface of choice."

NASA has used GL Studio on space equipment and to simulate moon landings and train for space missions. And GL Studio is utilized by almost every major space endeavor in the United States today, including ARTEMIS Gateway, the lunar living module that will orbit the Moon in the Moon to Mars mission.

Groundbreaking when it debuted, the DiSTI tool has stood the test of time. "We're still doing the same for F-18s and F-16s simulators today that we started 20 years ago," Swinski said. The company continually adds features and functionality as requirements in training grow, building on the original software of the GL Studio. Swinski also noted that DiSTI did not patent the GL Studio so its concepts are being used broadly across many platforms. Uses range from GUIs for heart monitors and rail systems to touchscreens in large agricultural equipment, aircraft, spacecraft, and automobiles.

Swinski described the SBIR as essential to the technology's success. "It really built the foundation for where we are today," he said.

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From linking an instructor with pilots in a training session to helping to create an Earth-Moon-Mars link, the SBIR steps taken decades ago by an Air Force laboratory reverberate across time and space.

Modernization Priorities: Cyber; Fully Networked Command, Control, and Communications (FNC3)
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National Defense Strategy Pillar: Force Readiness and Lethality