

## High-speed communications researchers at UCSD awarded two DOD grants totaling \$7.5 million over five years

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Two high-speed communications research programs at the University of California, San Diego have been awarded a total of about \$7.5 million in grants over the next five years from the Department of Defense.

The awards are part of a Focused Research Initiative sponsored by DoD, designed to support teams of academic and industrial collaborative projects.

In all, the initiative awarded funds to 16 projects worth up to \$100 million over the five-year life of the program.

At UCSD, a wireless multimedia communications project capable of supporting what is called a "digital battlefield" received more than \$5 million over the next five years.

"In this scenario, the Armed Forces would like to use this technology to have as much information as possible in as many places as possible and have it with complete flexibility in terms of motion," said Laurence Milstein, acting director of UCSD's Center for Wireless Communications.

As envisioned, the "digital battlefield" would focus around wireless communications devices capable of transmitting and receiving voice, print or even video information. High-speed wireless support would be mounted on mobile units, such as jeeps, tanks or trucks.

"What they really want is take advantage of the commercial technology in this field, but to do so with a military perspective in mind," said Milstein, co-principal investigator of the project with Walter Ku, UCSD professor of electrical and computer engineering.

Among other things, the military is seeking a system that's not only resistant to signal jamming from a potential enemy, but also is difficult to intercept.

"What we are looking at is the ability to hide a signal within the background noise so that an intelligent adversary has trouble determining whether or not you are transmitting," said Milstein.

Members of the industrial consortium participating in this project include InterDigital Communications, Hughes, TRW, Rockwell and Raytheon. Other collaborators include researchers from Naval Research and Development (NRAD) and the National Security Agency (NSA), in addition to UCSD engineering researchers Ramesh Rao, Joseph Pasquale, George Polyzos, Ronald Fellman, Paul Chau, Rene Cruz, Ramesh Jain and Peter Asbeck.

A second UCSD project, involving the high-speed transmission of complex images over fiber-optics networks, was awarded about \$2.5 million over the next five years. The goal is to transmit both medical or biomedical research images long-distances so sender and recipient can simultaneously view and even manipulate the same information.

Such a network would require the ability to transmit up to a trillion bits of information per second. In this manner, for example, battlefield physicians would be able to consult with experts in remote medical centers while viewing the same medical images on their computer screens.

"In one example, we could mix wireless communications and photonics," said Shaya Fainman, UCSD associate professor of electrical and computer engineering. "Here, images could be transmitted from a ship's clinic to someone who has expertise in a certain area that the ship-board physician needs."

Similarly, several researchers collaborating on the same project also could view and manipulate images over long distances over such a network.

"The idea is to allow researchers to remotely and securely access and view images that exist at a central location," said Fainman, co-principal director of the project.

Other researchers include faculty from the University of Illinois, Urbana-Champaign; and UCSD engineers Al Kellner (co-principal investigator), William Chang, Rene Cruz, Ronald Fellman, Ramesh Rao, and Paul Yu. Also participating in the project is Yuri Mazurenko, a Russian researcher from St. Petersburg who worked at UCSD last year under a NATO grant.

The UCSD grant is part of a larger DoD grant to a "graphics server" consortium that includes faculty from Brown and Purdue universities. The consortium, which also includes industrial participants, is led by Sing Lee, UCSD professor of electrical and computer engineering.

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