

UC San Diego Team Spearheads \$25 Million Project to Improve Human-Systems Interactions

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A research team of neuroscientists, cognitive scientists and engineers at the University of California, San Diego will play a leading role in a five-year, \$25-million Army Research Laboratory (ARL) project to better understand human-systems interactions.

The Collaborative Technology Alliance also includes four other universities, an industry partner, and the government. Of the project total, \$13.8 million will support research at UC San Diego.

The UC San Diego research team, headed by Scott Makeig and Tzyy-Ping Jung of the Swartz Center for Computational Neuroscience in the Institute for Neural Computation, will establish a research program anchored at the Swartz Center. The research into cognition and neuroergonomics will involve researchers from UC San Diego, the University of Michigan at Ann Arbor, the University of Texas at San Antonio, the University of Osnabrück of Germany, National Chiao Tung University of Taiwan, government researchers from ARL, and technology-transition specialists from the industry partner, DCS Corporation.

Makeig will serve as chief scientist, and eight other UC San Diego investigators from five departments will participate in the project.

UC San Diego's Vice Chancellor for Research, Art Ellis, who oversees organized research units (ORUs) including the Institute for Neural Computation, said that the grant demonstrates key trends in current research. "Universities are finding that interdisciplinary research and international teamwork significantly increase our ability to translate the discoveries in our laboratories into results that benefit society," he said.

According to chief scientist Makeig, "This is the largest category of basic research project the Army supports, and is intended to create a working alliance among university basic researchers, Army basic researchers, and applied research-and-development groups from industry and the Department of Defense."

Under the five-year contract, UC San Diego and its partners will work with an ARL group at Aberdeen, Maryland, to develop and demonstrate basic cognitive neuroscience principles guiding development of improved human-systems interactions in complex information environments. The goals of the alliance are to optimize information transfer between operators and advanced communication and control systems; to facilitate decision-making in complex, high-risk environments; and to implement advanced tools and techniques to perform individualized physiological and behavioral assessment in operational contexts -- for example, while interacting with complex information displays in advanced robotic vehicles.

The Swartz Center for Computational Neuroscience, a center that is part of UC San Diego's Institute for Neural Computation, was founded in 2001 by a gift from the Swartz Foundation of Old Field, New York. The center focuses on development, dissemination, and application of new computational methods for acquiring, modeling and interpreting human-brain-imaging data, particularly high-definition EEG recordings of human-brain electrical activity.

Under Makeig, the center is developing a new brain-imaging modality (mobile brain/body imaging or MoBI) that simultaneously combines high-density EEG, body-motion capture, and sensory-scene recording. Concurrently, Jung is developing applications of new wireless EEG systems in collaboration with colleagues at National Chiao Tung University.

"The time is fast approaching and is, in fact, now here," says Makeig, "when human brain dynamics are not just a topic for abstract scientific analysis and discussion, but can also be used to enhance the communication of severely handicapped persons - a field now known as brain-computer interface (BCI) development. Non-invasive brain electrical recordings - often called 'brain waves' - can also be used as an ongoing source of objective information about the changing state of alertness, attention, evaluation, motivation, and intent of persons operating complex systems.

"The Army Cognition and Neuroergonomics project is designed to accelerate progress in this direction at the basic level, hopefully leading to early tests of practical applications."

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