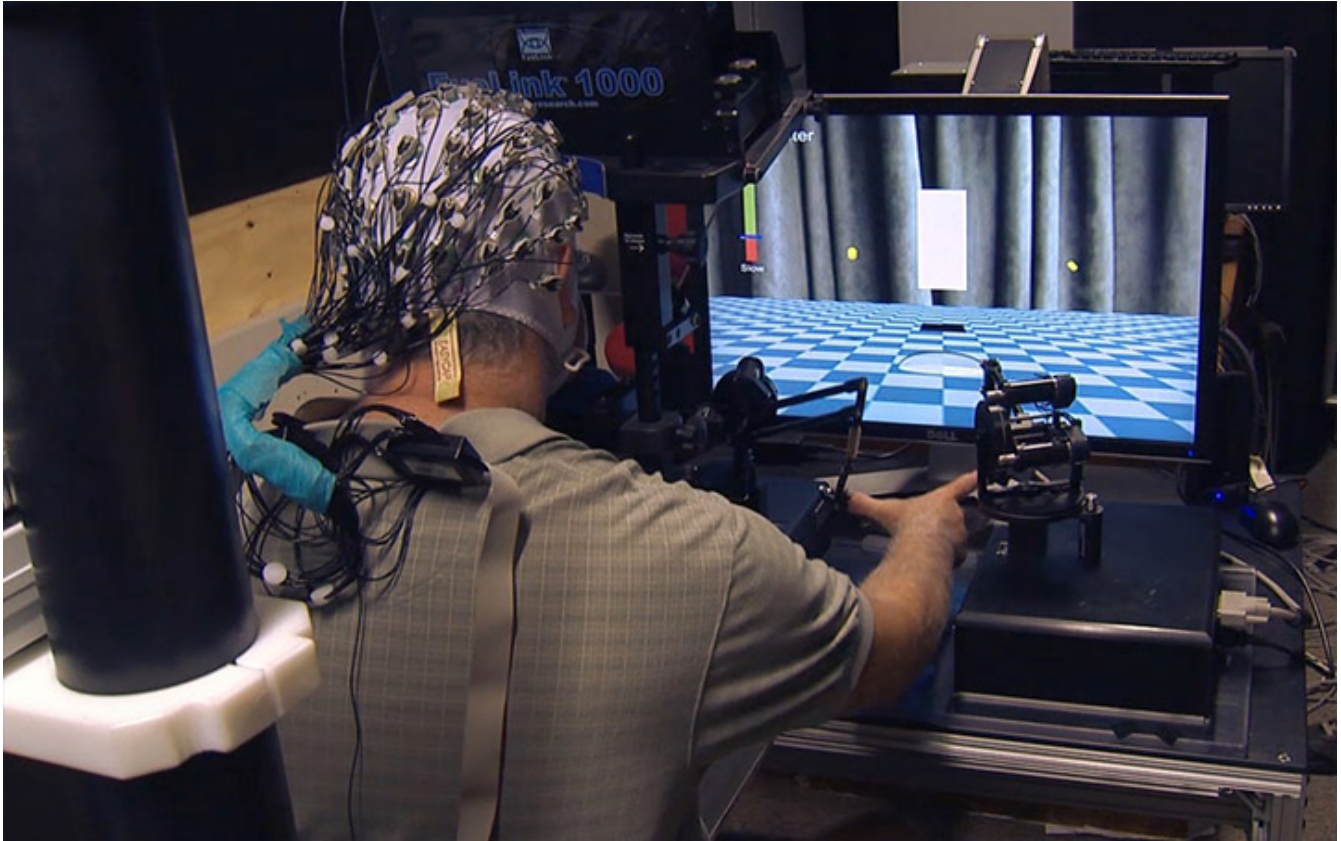April 02, 2014 | By Catherine Hockmuth

Bioengineer Studying How the Brain Controls Movement

Jim Bell is a Parkinson's patient who is working with researchers to better understand the brain dynamics of motor control in Parkinson's disease. The team is working to develop non-invasive therapies. Photo by National Science Foundation.

A University of California, San Diego research team led by bioengineer Gert Cauwenberghs is working to understand how the brain circuitry controls how we move. The goal is to develop new technologies to help patients with Parkinson's disease and other debilitating medical conditions navigate the world on their own. Their research is funded by the National Science Foundation's Emerging Frontiers of Research and Innovation program.

"Parkinson's disease is not just about one location in the brain that's impaired. It's the whole body. We look at the problems in a very holistic way, combine science and clinical aspects with engineering approaches for technology," explains Cauwenberghs, a professor at the Jacobs

School of Engineering and co-director of the Institute for Neural Computation at UC San Diego. "We're using advanced technology, but in a means that is more proactive in helping the brain to get around some of its problems—in this case, Parkinson's disease—by working with the brain's natural plasticity, in wiring connections between neurons in different ways."

Outcomes of this research are contributing to the system-level understanding of human-machine interactions, and motor learning and control in real world environments for humans, and are leading to the development of a new generation of wireless brain and body activity sensors and adaptive prosthetics devices. Besides advancing our knowledge of human-machine interactions and stimulating the engineering of new brain/body sensors and actuators, the work is directly influencing diverse areas in which humans are coupled with machines. These include brain-machine interfaces and telemanipulation.

The wireless dry-contact 64-electrode electroencephalogram (EEG) headset was contributed by Cognionics. Other highlighted resources include: Source Information Flow Toolbox and BCILAB for real-time predictive modeling and visualization of brain activity from the EEG data; and the NSF Temporal Dynamics of Learning Center Motion Capture Laboratory for brain-machine-body activity mapping in immersive virtual-reality.

MEDIA CONTACT

Catherine Hockmuth, 858-822-1359, chockmuth@ucsd.edu

UC San Diego's Studio Ten 300 offers radio and television connections for media interviews with our faculty, which can be coordinated via studio@ucsd.edu. To connect with a UC San Diego faculty expert on relevant issues and trending news stories, visit https://ucsdnews.ucsd.edu/media-resources/faculty-experts.