

Researchers harness virtual reality, motion capture to study neurological disorders

September 6 2018, by Mark Michaud



Credit: CC0 Public Domain

Neuroscientists at the University of Rochester Medical Center (URMC) have a powerful new state-of-the-art tool at their disposal to study diseases like Autism, Alzheimer's, and traumatic brain injury. The

Mobile Brain/Body Imaging system, or MoBI, combines virtual reality, brain monitoring, and Hollywood-inspired motion capture technology, enabling researchers to study the movement difficulties that often accompany neurological disorders and why our brains sometimes struggle while multitasking.

"Many studies of [brain activity](#) occur in controlled environments where study subjects are sitting in a sound proof room staring at a computer screen," said John Foxe, Ph.D., director of the UPMC Del Monte Institute for Neuroscience. "The MoBI system allows us to get people walking, using their senses, and solving the types of tasks you face every day, all the while measuring brain activity and tracking how the processes associated with cognition and movement interact."

The MoBI platform – which is located in the Del Monte Institute's Cognitive Neurophysiology Lab – brings together several high tech systems. Using the same technology that is employed by movie studios to produce CGI special effects, study participants wear a black body suite that is fitted with reflective markers. Participants are then asked to walk on a treadmill or manipulate objects at a table in a room fitted out with 16 high speed cameras that record the position of the markers with millimeter precision. This data is mapped to a computer generated 3-D model that tracks movement.

While they are walking, a virtual environment – a cityscape, for example – is projected on the screen in front of them which they must navigate. They can also be asked to perform task and make decisions in response to what is being projected on the screen. While this occurring, the brains of [study participants](#) are monitored via a high-density electroencephalogram (EEG) that detects electrical activity using small metal electrodes attached to the scalp.

The motion tracking and EEG data are synchronized, allowing

researchers to track which areas of the brain are being activated when walking or performing task and study how the brain responds while moving, performing tasks, or doing both at the same time.

This information could provide new insight into developmental diseases like Autism, which is often characterized with difficulty in processing sensory information from multiple sources. Individuals with Autism also often have an abnormal gait. People with Alzheimer's, dementia, and sports concussions also experience movement difficulties.

"There is competition between the processes that allow you to walk well and the processes that allow you to think well," said Ed Freedman, Ph.D., an associate professor in the Del Monte Institute and principal investigator in the Cognitive Neurophysiology Lab. "We don't fall when we are sitting at a desk performing a task, we fall when we are walking down the street, avoiding traffic and other people, checking our phone, and thinking about what we are going to cook for dinner. We can use the MoBI to reveal underlying problems in the allocation of cognitive resources in individuals with neurological disorders because we are essentially stressing the system by asking them to perform task while on the treadmill."

The researchers are currently using MoBI to establish a set of data with healthy individuals. This baseline of brain activity can then be compared to people with neurological disorders to identify new "signatures" of disease and brain processes that can be employed during clinical trials.

"When you get good measurements of how the brain works and contrast that activity with people who are depressed or suffer from Autism or dementia, you can develop biomarkers – or neuro-markers – of disease," said Foxe. "Using these neuro-markers we can then test whether a given intervention or therapeutic is actually working."

Provided by University of Rochester Medical Center

Citation: Researchers harness virtual reality, motion capture to study neurological disorders (2018, September 6) retrieved 10 April 2024 from

<https://medicalxpress.com/news/2018-09-harness-virtual-reality-motion-capture.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.