Study combines EEG and MEG imaging to understand how brain processes attention

Data will be used to create computerized model for future non-invasive cognitive and clinical studies of attention disorders

Ramesh Srinivasan, UCI cognitive sciences associate professor, and George Sperling, UCI cognitive sciences distinguished professor, have received a $2.36 million grant from the National Institutes of Health to develop a non-invasive approach for studying areas of the brain responsible for attention.

The study will be one of the largest of its scale to combine electroencephalography (EEG) and magnetoencephalography (MEG) imaging methods in order to simultaneously measure the electric and magnetic fields of the brain during performance of attention related tasks. Data collected will be used to develop a software generated model of the brain for future non-invasive cognitive studies and clinical brain studies of attention disorders.

Collaborating with Srinivasan and Sperling on this study are John Serences, UCSD psychology assistant professor, and Mingxiong Huang, UCSD radiology professor.

"Using location or features to detect an object activates many areas of the brain," says Srinivasan. "We have a limited ability to make inferences about the nature of the brain activity involved in these attention related tasks because of both the complexities of the brain and limitations in our understanding of the signals we record from the brain."

Using EEG will allow the researchers to track activity in the gyri, or ridges, of the brain while MEG will track activity in the sulci, or folds, he says. The concurrently collected measures will provide a better overall picture of the multiple areas activated in attentional processes, and the resulting computerized model that will be generated from these readings will help researchers to better interpret brain activity involved in cognitive processes.

The study will involve volunteer human subjects who will be asked to pick out specific objects on a computer screen using cues such as object location and color. EEG and MEG readings taken during the process will allow the researchers to see and map the different areas of the brain that interact when performing the attention-related task.

The researchers will then use the data generated from the EEG and MEG signals to create a software model of the brain that will simulate the human brain's neural activity during the attentional process.

"The model will improve our ability to interpret brain activity in experiments on attention and, potentially, how deficiencies in attention networks impact disorders such as in cases of autism, ADHD and Alzheimer's," says Srinivasan.

The study began in September 2009 and will run through May 2013.