

Incorporating VR and Brain Imaging Technologies: Implications for Rehabilitation

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Description:

There are several lines of research currently underway in a number of labs incorporating Virtual Reality (VR) and brain imaging technologies that may shed additional light not only on brain responses to VR induced environment but also on mechanisms of “*neuroplasticity*” that may be impaired as a result of TBI and other neurological deficits including those in elderly subjects. In this workshop we will review the fundamentals of brain imaging including: Electroencephalography (EEG) in clinical research and MRI/fMRI, DTI/MRS in clinical practice. Virtual Reality applications for assessment and rehabilitation of cognitive/motor functions will be discussed by presenting hardware and software requirements. There will be a specific demonstration of Demo *HeadRehab LCC* VR testing procedures and clinical examples. Incorporating virtual reality with brain imaging as it relates to brain computer interfaces will also be presented.

Objectives:

1. To describe current status of VR research in medical rehabilitation of various patients’ population (including those suffering for Traumatic Brain Injury);
2. To demonstrate a number of VR applications for assessment/rehabilitation of motor-cognitive deficits; and
3. To present current status of research and outline future challenges incorporating VR and brain imaging technologies in a clinical setting.

Intended Audience: Researchers and clinicians



Semyon Slobounov received his first Ph.D. from University of Leningrad (USSR), Department of Psychology in 1978 and his second Ph.D. from University of Illinois at Urbana-Champaign, Department of Kinesiology in 1994. He is Professor of Kinesiology, Neuroscience & Medical Rehabilitation and Director of Psychophysiology of Movement laboratory at Pennsylvania State University and fellow of American Academy of Kinesiology. His current research funded by NIH focused on application of modern technologies, including VR, fMRI and EEG for assessment and rehabilitation of athletes suffering from concussion. He has published more than 100 papers in referee Journals including *Experimental Brain Research*, *Clinical Neurophysiology*, *Psychophysiology*, *Neuroscience Letters* etc. He is the author of two recently published books by Springer: “*Foundations of Sport-Related Injuries*” and “*Injury in Athletics: Causes and Consequences*”. He is an active member of Society for Psychophysiological Research and a fellow of American Academy of Kinesiology.



Elena Slobounov is a Lead Applications Programmer/Analyst in the Visualization Group of Research Computing and Cyberinfrastructure at Penn State University. She has twenty years of experience in scientific and graphics programming. Recent areas of interest include graphics programming for interactive virtual worlds within immersive environments, web-extensible graphics programming, and programming of VR visual stimuli for fMRI systems integrated with fMRI compatible interactive devices. Ms. Slobounov holds a BS degree in Electronic Engineering from the Moscow Institute of Electronic Engineering, an Associate Degree in Computer Graphics and Visualization from Parkland College in Champaign, Illinois, and a Master's Degree in Mechanical Engineering from Penn State.