Announcing the Final Examination of Awad Aljuaid for the degree of Doctor of Philosophy

Time & Location: April 6, 2016 at 1:00 PM in ENG 2 312 L
Title: NEUROERGONOMICS STUDY: ANALYSIS OF BRAIN EEG’s ACTIVITY DURING MANUAL LIFTING TASKS

Electroencephalography (EEG) has been shown to be a reliable tool in neuroergonomics studies due to the relatively low cost of brain data collection and limited body invasion. The application of EEG frequency bands (including theta, alpha and beta), enjoyed a wide range of interest in physical and cognitive ergonomics. The psychophysical approach has been used for decades to improve safe work practices by understanding human limitations in manual materials handling. The main objective of this research project was to study brain’s EEG activity expressed by the power spectral density during manual lifting tasks, related to: 1) the maximum acceptable weight of lift (MAWL), and 2) isokinetic and isometric lifting strength tests measurement outcomes.

The first study investigated changes in EEG power spectral density during determination of MAWL under low, medium and high lifting frequencies. A high-density wireless dry cell EEG device has been used to record EEG signals. Twenty healthy males participated in this experiment study. Subjects repeated the same experiment after two weeks. Analysis of variance (ANOVA) showed significant differences in EEG power spectral density between different lifting frequencies at three main brain areas (frontal, central and parietal). The second study revealed differences in brain activity during isokinetic and isometric strengths measurements, based on recording and analysis of EEG power spectral density.

This research project is the first study of EEG activity during manual lifting tasks, including the assessment of MAWL by the psychophysical method, as well as the measurement of human isokinetic and isometric strengths. The results of this project are considered critical to our increased understanding of the neural correlates of human physical activities, and consequently, should have an impact on the success of workplace design that considers brain activity related to specific human capabilities and limitations in manual lifting tasks.

Major: Industrial Engineering

Educational Career:
Bachelor’s of Systems Engineering, BS, 2003, King Fahd University of Petroleum and Minerals, Saudi Arabia
Master’s of Industrial Engineering, MS, 2009, King Abdulaziz University, Saudi Arabia

Committee in Charge:
Petros Xanthopoulos, Chair, Industrial Engineering and Management Systems
Waldemar Karwowski, Co-Chair, Industrial Engineering and Management Systems
Peter Hancock, Department of Psychology, University of Central Florida
Peter Kincaid, Institute for Simulation & Training
Pamela McCauley, Department of Industrial Engineering and Management Systems
Gene Lee, Department of Industrial Engineering and Management Systems

Approved for distribution by Petros Xanthopoulos, Committee Chair, on March 21, 2016.

The public is welcome to attend.