

Analysis of Human Mental and Behavioral Models for Development of an Electroencephalography-Based Human Performance Management System

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Abstract : Accidents at Nuclear Power Plants (NPPs) occur due to various factors, notable among them being poor safety management and poor safety culture. During abnormal situations, the likelihood of human error is many-fold higher due to the higher cognitive workload. The most common cause of human error and high cognitive workload is mental fatigue. Electroencephalography (EEG) is a method of gathering the electromagnetic waves emitted by a human brain. We propose a safety system by monitoring brainwaves for signs of mental fatigue using an EEG system. This requires an analysis of the mental model of the NPP operator, changes in brain wave power in response to certain stimuli, and the risk factors on mental fatigue and attention that NPP operators face when performing their tasks. We analyzed these factors and developed an EEG-based monitoring system, which aims to alert NPP operators when levels of mental fatigue and attention hinders their ability to maintain safety.

Keywords : brain imaging, EEG, power plant operator, psychology

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