Project Title: Predicting Delirium in EEG for Patients in the ICU

Professor Jay Lee  
Director, IMS Center  
560 Baldwin Hall  
Department of Mechanical & Materials Engineering  
Cincinnati, OH 45221-0072  
jay.lee@uc.edu  
Phone: 513-556-4614

Project Description

The NSF Industry / University Cooperative Research Center on Intelligent Maintenance Systems has worked over the past 12 years to develop a suite of algorithms and techniques for predicting the condition and remaining useful life of industrial assets. The Center has recently begun collaborating with a number of medical departments at UC to adapt its technologies and experiences to the fields of healthcare and sports medicine.

One such effort focuses on delirium and involves monitoring the brain state of patients in an intensive care unit, and developing analytics models for providing physicians with additional information to support care decisions. Delirium, a brain state of confusion or decreased awareness, develops in 20-30% of patients in the intensive care unit (ICU). The onset of delirium is associated with increased mortality and costs. The medical assessment for delirium is only carried out every 12 hours, however with the aid of scalp EEG, which measures electrical activity in the brain, delirium may be detected earlier, for more timely care. The goal of this project is to use real scalp EEG data from the ICU with labels for the state of delirium to develop a technique to detect the onset of delirium and possibly predict this onset before it occurs.

The student selected for this project will develop important MATLAB techniques necessary to explore neurologic data sets. Moreover, working one on one with graduate students in this area, the student will learn how to process EEG data, how to extract meaningful information from this data and how to properly analyze this data for conversion into important medical knowledge.