

**Department of Mechanical Engineering  
and Department of Psychiatry  
COLLEGE OF Engineering/Medicine**

**SUMMER RESEARCH OPPORTUNITIES  
FOR UNDERGRADUATE WOMEN**

**APPLICATION DEADLINE: March 3, 2008**

*The Department of Mechanical Engineering, in collaboration with the Department of Psychiatry, is pleased to offer the following research project for the summer of 2008. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and, if possible, develop a timetable for the twelve-week research period.*

**Condition Monitoring For Evidence-Based Care Of Psychiatric Patients**

**Professor Samuel Huang  
Department of Mechanical Engineering  
698 Rhodes Hall  
Cincinnati, OH 45221-0072  
Tel: (513) 556-1154  
Fax: (513) 556-3390  
Email: sam.huang@uc.edu**

**Project Description**

To optimize patient recovery in today's world of higher drug costs and shorter hospital stays, physicians are moving towards evidence-based patient care which promotes the collection, interpretation, and integration of applicable patient-reported, clinician-observed, and research-derived evidence to improve the quality of clinical judgments and facilitate cost-effective healthcare. This is an admirable but currently illusive goal because mature supporting technologies are lacking. The philosophy of evidence-based patient care is similar to that of condition-based maintenance (CBM) in manufacturing, which advocates the monitoring of production equipment using various sensors to enable real-time diagnosis of impending failures so the right maintenance actions can take place in a timely fashion and on an as-needed basis. CBM research is relatively mature and the knowledge generated, namely, diagnosis/prognosis modeling (i.e., techniques for mining and interpreting sensor data), is applicable to patient care.

The goal of this NSF (National Science Foundation) supported project is to adapt condition monitoring technology for evidence-based care of psychiatric patients. The focus on psychiatric patients is due to the high cost of psychotropic medication and pressing questions regarding the safety of antidepressant drugs. The challenges for this technology adaptation are mainly due to the nature of patient data; namely, large number of parameters and gaps (missing values) in the data. As such, the dimensionality of these datasets must be reduced and the missing value problem must be resolved so methods developed in CBM research can be effectively applied. We are seeking one or two undergraduate students to work with our research team (Dr. Sam Huang from the College of Engineering, Dr. Lawson Wulsin from the College of Medicine and graduate students

to identify existing dimensionality reduction and missing data imputation techniques and apply these techniques to real-world medical datasets.