

**Department of Civil and Environmental Engineering**

**COLLEGE OF ENGINEERING**

**SUMMER RESEARCH OPPORTUNITIES  
FOR UNDERGRADUATE WOMEN**

**APPLICATION DEADLINE: March 3, 2008**

*The Department of Civil and Environmental Engineering 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.*

**THE DEPLOYMENT OF WIRELESS SENSORS TO MONITOR CRITICAL AIR POLLUTANTS**

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**Project Description**

The technologies in wireless communications, sensors and information management algorithms have progressed tremendously in recent years. The sensors can be made very small and yet powerful. However, the methods for environmental monitoring have remained conventional and are limited to only a very small number of locations due to the high cost and labor intensiveness. For example, for the 1,748 square miles of the four-county southwestern Ohio area serving more than 1.5 million people, there are only two monitoring stations for CO, two for NO<sub>x</sub> and seven for ozone. The monitoring capability is extremely inadequate as this region will be designated non-attainment for ozone and particulate matter less than 2.5 μm in the near future due to the emissions from traffic, industry and the local meteorological and geographical conditions. Policy makers and the public in the greater Cincinnati region need a better knowledge base in order to make informed decisions.

Therefore, an interdisciplinary team of researchers started to develop and integrate a wireless sensor network incorporating new, extremely efficient data management algorithms to monitor critical air pollutants, such as CO, NO<sub>x</sub> and ozone, and to use the data obtained to study correlations of traffic emissions to ground level ozone variations in

and around the main campuses of the University of Cincinnati. Wireless sensor network has been set up and data collection is on-going.

**The REWU work:** The project team would like to invite a REWU student to participate in the project and learn how wireless sensors can become potential tools for air quality monitoring. The student will work with the mentor and graduate students to calibrate the sensors, measure the air pollutant concentrations on campus (pollution profile) and then compare the results with those obtained by wireless sensors. She will help with sensor assembling and deployment also.

**Location:** As of now, there is 70% of the chance that the student will work at the **National University of Singapore** for this assignment. She will work there for three months with the mentor, a UC graduate student and students at NUS. Travel, room and board will be provided with a moderate stipend. The student can be exposed to the rich and diverse cultures in Singapore without much challenge as the official languages in Singapore are English and Chinese. If the assignment is in UC (30% chance), then it follows the regular REWU procedures. The mentor will know this by the end of February.

**Requirements:** It is desirable for the applicant to be independent and adventurous as overseas work is involved. She should be pre-junior or higher, and co-op experience is highly desirable. The students may need to work with the group during the spring quarter to obtain some experience with wireless sensors.