DEPARTMENT OF MECHANICAL, INDUSTRIAL AND NUCLEAR ENGINEERING

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: MARCH 1, 2002

The Department of Mechanical, Industrial and Nuclear Engineering is pleased to offer the following research projects for the summer of 2002. Interested students are urged to contact the faculty member(s) directing the project(s) that most interest 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.

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Extracting physical significance from numerical results of computational fluid dynamics research:
Computer simulation is a powerful tool for investigating physical systems. The computational methodologies employed for realistic systems generate a vast amount of numerical data. Extracting inferences about physical behavior from the numerical data is a challenging task, and yet it is among the most critical steps in the investigation. The field of fluid dynamics is all-pervasive, as air and water occupy enormous expanses in our world. Research in computational fluid dynamics (CFD) enables computer simulation of flows encompassing diverse applications including flow around automobile bodies and aircraft wings, inside passenger compartments of transport vehicles, cardiovascular systems, etc. As part of the REWU project, the student will engage in post-processing of numerical data resulting from ongoing CFD research, for the purpose of extracting physical significance from the data. The student will have the opportunity to learn various techniques of post-processing, including graphical presentation and carpet plots for two-dimensional and three-dimensional flows, flow visualization techniques through use of mass-less particle tracers, and animations for time-dependent flows. The experience will be useful in any general field of research involving computer simulations; it should also be useful in exposing the student to methodologies in CFD research.

Professor Mark J. Schulz
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Sensor and Actuator Development

This project is to develop Piezoceramic Fiber and Carbon Nanotube sensors and actuators for use in actuating and measuring vibration in smart structures. The undergraduate student will work in the Smart Structures Laboratory in room 440B Baldwin and assist graduate students in setting-up and performing experiments and in processing the data from the experiments. The experiments involve building different configurations of sensors and actuators and evaluating their performance using vibration signal processing. The undergraduate student may also perform literature searching and computer simulations. It is anticipated that the undergraduate student could co-author a conference or journal paper with their graduate student mentor.