

**Engineering Research in Hybrid Electric and Plug-In Hybrid Electric Vehicles
Summer Research Experience for Undergraduates (REU)
Summer 2009**

<http://power.iit.edu/>

There are over 250 million registered passenger vehicles in the U.S. Over 40% green house gas and 70% of emissions comes from transportation and transportation is 99% dependant on one source of the fuel, which is petroleum. As America continues to rely more and more upon vehicular transportation, the looming problems of fuel supply and air pollution become more imminent. The internal combustion engine (ICE) has long been the mechanism that propels our vehicles, and gasoline has been its major source of energy. This fuel supply is dwindling and researchers are looking for new sources of energy. In fact, demands for higher fuel economy, performance, and reliability as well as reduced emissions push the automotive industry to seek advanced technologies such as electrification of ancillaries and engine augmentations. An immediate solution to this problem is essential, and the most promising answer lies in hybrid electric and plug-in hybrid electric vehicle (HEV and PHEV) technologies. Hybrid propulsion systems are further improving the fuel economy. In fact, HEVs are promising the most practical solution to achieve very high fuel economy (up to and beyond 80 mpg) and very low emissions. The hybrid technology combines the high-efficiency electric motor with the IC engine to produce a vehicle that is capable of providing the torque necessary to safely navigate the streets, as well as boost fuel efficiency far beyond the reaches of any normal ICE vehicle.

Research

To address the emerging workforce and educational needs of the U.S. automotive industry for the advanced vehicular technologies, such as electric vehicles (EVs), hybrid electric vehicles (HEVs), fuel cell vehicles (FCVs), and plug-in hybrid electric vehicles (PHEVs), this REU program initiative intends to provide research training and mentoring to undergraduate students. Oriented toward students' professional development



Power Electronics and Motor Drives Laboratory: Hybrid and Plug-in Hybrid Electric Vehicle Research at Illinois Institute of Technology

and looking to promote interest in graduate studies, the program will be based at the Electric Power and Power Electronics Center (EPPEC) in Electrical and Computer Engineering Department (ECE) of the Illinois Institute of Technology (IIT). The primary goal of this program is for students to complete a hybrid electric vehicle design related research project working with a mentor from IIT. Typical examples of the projects to be offered and the mentors involved are: Integrated Starter/Alternator-Motor Drive for Automotive Applications; Hybrid Electric Vehicle Conversion; Plug-In Hybrid Electric Vehicles; and Mechanical, hydraulic, pneumatic, and thermal systems for Advanced Automotive Systems.



Ethics

Activities in ethics will be organized in coordination with the Center for the Study of Ethics in the Professions (CSEP). The CSEP was established in 1976 to promote research and teaching on practical ethical issues in the professions. It was the first multidisciplinary ethics center to focus on the professions. CSEP continues to be **one of the nation's leading** ethics centers, and is internationally recognized for its work on ethics in science and engineering.

Social and Outreach

Students in the program get to spend a summer in one of the most dynamic cities in the United States. IIT's Mies van der Roghe designed campus is a national historic site, located just south of Chicago's Loop and down the street from Cellular Field, the home of the Chicago White Sox. The location allows students to enjoy Chicago's extensive list of summer festivals, cultural experiences, and sporting events. Social activities include a student/faculty cookout, and REU dinners.

Dates

The program is 10 weeks, from early June to August.

Support

Students will receive a stipend, room and board, and travel coverage for the trip to and from Chicago.

Eligibility

Students involved in the summer program can be funded through NSF-REU program.

For all programs the following criteria apply:

1. Students should have declared engineering major (e.g., electrical, computer, mechanical, transportation, aerospace, and chemical, among others).
2. Students should have a minimum GPA of 3.00/4.00.
3. Selected applicants must be US citizens or permanent residents.
4. *Women and students from underrepresented minority groups are encouraged to apply to all programs.*

Information

Applications are due April 15, 2009. Please email the application material to Prof. Alireza Khaligh (khaligh@ece.iit.edu). If you have questions, contact:

Alireza Khaligh, Ph.D.

Director, Energy Harvesting and Renewable Energies Laboratory (EHREL)

khaligh@ece.iit.edu

Phone: (312) 567-3444