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Web site: <http://www.mines.edu/Research/>

## ***Advanced Control of Energy and Power Systems (ACEPS)***

The Advanced Control of Energy and Power Systems Center (ACEPS), based in the Engineering Division, features a unique partnership consisting of industry, the National Science Foundation (NSF), the Department of Energy (DOE), the Electric Power Research Institute (EPRI), Colorado School of Mines (CSM) and several other universities. The mission of ACEPS is to conduct fundamental research and applied research supporting the technical advancement of the electric utility industry, their customers, and component suppliers in the field of electric power systems with special emphasis on the advanced/intelligent control and power quality in the generation, transmission, distribution, and utilization stages; using such research as a means of advancing graduate education.

Center research projects focus on the development of an intelligent energy system that will employ advanced power electronics, enhanced computer and communications systems, new smart sensor and actuators, and smart interactive utility/customer interface systems. Examples include: intelligent substation, advanced short-term load forecasting, new sensors and monitoring systems, localized and adaptive monitoring systems for transmission and distribution networks, and intelligent automatic generation control for transient loads.

Due to the strong interest shown by other institutions and national and international utilities, ACEPS has been transformed into an NSF Mega-Center which includes ten other universities and more than thirty industrial members. With this expansion, and given the electric power deregulation phase, the power center has become a key national resource for the Research & Development (R&D) needs of this major industrial sector.

### ***Background:***

- National Science Foundation Industry/University Cooperative Research Center
- Established in 1995
- Universities include Purdue, Arizona State, and Wichita State
- Eight faculty members and ten graduate students are involved ACEPS research activities
- Funding provided by National Science Foundation, Electric Power Research Institute, U. S. Department of Energy, and more than a dozen utilities from Colorado, Indiana, Nebraska, Arizona, Kansas, and such international utilities as EDF (France) and ISA (Columbia)

### ***Areas of Expertise:***

- Intelligent control systems; Neuro-F fuzzy control
- Real-time monitoring and advanced diagnostic systems
- Artificial intelligence
- Advanced acoustic, optical and electromechanical sensors
- Pollution reduction; Transformers and breakers
- monitoring; Smart substations
- Power quality
- Nondestructive evaluation
- Advanced power electronics
- Remote sensing, security, and control

### ***Sponsoring Organizations:***

- National Science Foundation
- Electric Power Research Institute
- U.S. Department of Energy
- Industry participants
- Department of Energy
- Industry participants

### ***Method of Technology Transfer:***

- Monthly meetings at utilities sites
- Semi-annual meeting with Industry Advisory Board (IAB)
- Summer internship for center graduate students at sponsors' sites
- Quarterly project review meetings
- Publication of scientific reports
- Implementation of research results at sponsors' facilities
- **Web site:** <http://egweb.mines.edu/aceps/>

### ***Spin-offs / Contributions:***

- Improved quality and processing of energy and power systems; support for new systems applications
- Advanced monitoring system for transmission lines
- Intelligent substation
- Newly pioneered utility/customer real-time electronic communication

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