

PRESS RELEASE

From the University of Illinois Information Trust
Institute



Efforts Underway to Address Critical Shortage of Power Systems Engineers

The Information Trust Institute (ITI) at the University of Illinois recently held a national workshop in Fontana, Wisconsin as a step in addressing a growing national concern: the disproportionately heavy impact of the U.S.'s aging workforce problem on the power industry. The Cyber Security for Process Control Systems Summer School, which was held June 16-20, was organized as part of the educational activities of the TCIP Trustworthy Cyber Infrastructure for the Power Grid Center, funded by the National Science Foundation (NSF), the U.S. Department of Homeland Security, and the U.S. Department of Energy.



Tom Malec of the U.S. Department of Energy addresses the Summer School attendees.

76 million Americans belong to the “baby boomer” generation born between 1946 and 1964, and they are expected to start retiring in large numbers by the end of this decade. In the power industry alone, approximately half of the 400,000 workers in the U.S. will be eligible to retire in the next 5 to 10 years. Such mass departures are seen as a significant problem for the entire U.S. economy, as the declining birth rates of Generation X have meant that not enough young people have entered the workforce to replace the retiring baby boomers.

Changing trends in young people’s career aspirations are expected to place particularly heavy strain on certain areas of the economy, including power. Enrollment in U.S. institutions of higher education has been rising steadily over the past 20 years, but enrollment in engineering programs has been declining. Power engineering studies have experienced a particularly serious downturn in student interest, as a result of which American universities are graduating only one-fourth the number of power engineers they produced in the 1980s.

The problem was highlighted at a November 6, 2007 U.S. Senate Committee hearing on the domestic energy industry, at which Department of Energy representative Patricia Hoffman testified that growth in the needs of the power industry is outpacing the number of qualified personnel available. “There are indications that the power engineering education system in the United States is actually weakening,” she stated, “and the rate of weakening will likely escalate.” Her remarks were based in part on a study entitled “Workforce Trends in the Electric Utility Industry” that was published by the Department of Energy in 2006. The study found that universities, including some top-tier research institutions, have responded to low student interest by scaling back or even eliminating programs in power engineering. It also noted that many of the surviving programs now limit themselves to teaching applied skills, without communicating a deep understanding of power systems theory. “Students are trained on how to use tools and technologies to complete work assignments, but few students emerge with the ability to develop the tools themselves,” it

concluded.

Experts say that the power industry's problem is especially serious because the labor pool reduction is occurring just as fundamental changes are taking place in the technology used to control power delivery. "The power grid is evolving into what we call a Smart Grid," explained Peter W. Sauer, a leading power expert who is a professor in ITI and the Department of Electrical & Computer Engineering at Illinois. "By 'Smart Grid' we mean a power delivery system that uses sophisticated computer networking technology to make service more flexible, interactive, and robust. There are lots of reasons why this change is happening. For one thing, deregulation of the power industry created complex problems related to information sharing among different agencies and industry competitors. At the same time, people have realized that the power grid is a dangerously attractive, high-value target for terrorist attacks, and that we have to take steps to make it more resilient to cyber attack. The down side is that it's challenging to get enough qualified people in place to support it. You have to have a decent supply of people trained in both the classical power side of things and also computer networking. There just aren't enough of those people coming through the pipeline at universities."

Last fall, a group of TCIP researchers, power industry experts, and government officials from the NSF, Department of Energy, and Department of Homeland Security discussed how TCIP could help solve the problem of inadequate training. "We thought that an intense, week-long summer school would be an effective approach," said William H. Sanders, who leads the TCIP Center and is also Director of ITI. "It turned out we were right. It's simply the right time for a program like this. The need is recognized. We had no trouble attracting top people to speak, and we had a tremendous response from active industry practitioners and graduate students who wanted to attend." Sanders says that due to the enthusiastic response, there are tentative plans to hold similar workshops on a regular basis, perhaps every two years.

Last month's inaugural offering of the summer school, which was called the Cyber Security for Process Control Systems Summer School, covered various topic areas related to cyber security of the power grid, including an overview of threats, background in control systems and cyber security, and current approaches for protecting control systems, among other subjects. ITI's Principal Research Scientist, Himanshu Khurana, who chaired the organizing committee for the school, explained that "the school was successful in achieving a number of goals. It included lectures and discussions covering topics in power systems, computer networking, and cyber security, and initiated a dialogue on a long-term research and education agenda needed to produce the kind of workforce that will keep the power grid resilient for the future. This dialogue between academia, industry, and government is exactly the kind of dialogue needed to ensure protection of the nation's critical infrastructure, like the power grid."

"The workshop brought students face to face with key power grid and security experts, and with the problems the nation must solve to safeguard the electrical power supply," said Roy Campbell, who is the Director of the National Center of Academic Excellence in Information Assurance Education and Research at the University of Illinois, a computer science professor, and a researcher in ITI. "The workshop was both sobering and inspiring. It offered the students a real opportunity to contribute to a safer world by solving some major limitations of current technology."

The program was sponsored by NSF, the U.S. Department of Energy, and corporate sponsors Open Systems International and PJM Interconnection, with additional support from the U.S. Department of Homeland Security. Sponsorship covered the cost of 32 scholarships in order to support student attendance; a total of 84 people attended. Speakers came from the U.S. Department of Energy, the University of Washington, Schweitzer Engineering Laboratories, the Pacific Northwest National Lab, GE Energy, N-Dimension, the Electric Power Research Institute (EPRI), EnerNex, Honeywell, SRI, the University of Lisbon, MIT Lincoln Laboratory, Idaho National Labs, Gehrs Consulting, and the U.S.

Department of Homeland Security. The event was organized by TCIP researchers from the University of Illinois, Washington State University, Dartmouth College, and Cornell University.

Further information on the Summer School is available at its web site,
<http://www.iti.uiuc.edu/events/SummerSchool2008.html>.

About the Information Trust Institute (ITI)

The Information Trust Institute is a multidisciplinary cross-campus research unit housed in the College of Engineering at the University of Illinois at Urbana-Champaign. It is an international leader combining research and education with industrial outreach in trustworthy and secure information systems. ITI brings together over 90 faculty, many senior and graduate student researchers, and industry partners to conduct foundational and applied research to enable the creation of critical applications and cyber infrastructures. In doing so, ITI is creating computer systems, software, and networks that society can depend on to be trustworthy, that is, secure, dependable (reliable and available), correct, safe, private, and survivable. Instead of concentrating on narrow and focused technical solutions, ITI aims to create a new paradigm for designing trustworthy systems from the ground up and validating systems that are intended to be trustworthy. www.iti.uiuc.edu

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