PRESS RELEASE

From the University of Illinois Information Trust Institute

Information Trust INSTITUTE

University of Illinois Systems Trust Research Recognized with 2 Awards

Two very different groups of researchers in the University of Illinois Information Trust Institute (ITI) have just had their work honored by one of the leading forums for cutting-edge research in systems science. Both groups are doing work that promises significant long-term benefits to the general public, by improving the technical standards for online computer systems and by making electric power consumption cheaper and less wasteful.

The researchers won Best Paper awards in their respective tracks at the Hawaii International Conference on System Sciences (HICSS-41), which took place January 5-8, 2008. Law Professor Jay Kesan's paper "An Empirical Examination of Open Standards Development," co-authored by Rajiv Shah, won the Best Paper award in the track on Electronic Government. In the Electric Power Systems Restructuring track, the Best Paper award was won by "An Integrated Architecture for Demand Response Communications and Control," written by students Michael LeMay and Rajesh Nelli with Electrical & Computer Engineering Professor George Gross and Computer Science Professor Carl Gunter.

"We are deeply honored to have received the award," said LeMay, who is pursuing a Ph.D. degree in Computer Science. "We hope that it'll bring increased attention to our work, and help inspire new directions in critical infrastructure protection research."

LeMay's paper, which emerged in part from the work of ITI's Trustworthy Cyber Infrastructure for the Power Grid (TCIP) Center, introduces a new system called the Meter Gateway Architecture (or "MGA") that could lower electricity consumers' power bills, while at the same time preventing excess emissions and fuel consumption.

The price of electricity depends on the current mix of generators and can change quite frequently, sometimes once per second. Both customers and utilities can benefit from schemes that allow customers to shift their energy consumption to cheaper periods, as customers can save money and utilities can run and upgrade their expensive equipment less frequently. Furthermore, since the most expensive generators tend to be the dirtiest, a reduction in demand at peak times can have an environmental benefit.

Realistically, most power consumers can't take the time to stay abreast of changing prices and adjust their lifestyles accordingly. The MGA offers an automated way to collect real-time pricing information from electric meters or the Web, and then adjust the electricity consumption of a home or business's various appliances or heating and cooling systems. The approach is designed to use sophisticated algorithms that tailor electricity reductions to the individual needs of various kinds of appliances, while at the same time keeping the control systems as simple and versatile as possible. The research team successfully tested the MGA on two appliances: a laptop that charged its battery during low-cost periods, and an air conditioner that "pre-cooled" an apartment during periods when electricity was cheap. They found that the costs of running the laptop were reduced by over 8%, and that pre-cooling allowed the air conditioner to run less frequently during the high-cost periods, while still keeping the apartment comfortable.

Prof. Jay Kesan's paper brought new insights to current efforts to streamline and shorten the process by which technical standards are developed for computers and communications. Standardization is crucial in allowing for interoperability and intercommunication among different systems. In the past, technological standards have often been set by private companies or formal standard-setting organizations. However, as the importance of standards has become more widely understood, new ways to develop standards collectively have evolved. The most prominent approach is that of "open standards," which include public participation in the development process, are publicly available at minimal cost, and are either licensed on very reasonable terms or not controlled by an organization at all.

Kesan's research analyzed a very large number of open standards, going beyond the standard practice of analyzing small numbers of hand-picked case studies. His study revealed inequalities in the impact of open standards that suggest a "power-law relationship," which means that a small number of standards have a large impact, while a very large proportion of standards have very little impact. The work also found that the duration of the development process of an open standard does not affect the standard's ultimate impact, but that the length of the document that describes a standard does affect its impact; longer standards tend to have greater impact. As the length of a standard usually reflects its level of technical complexity and the level of participation in its development, the implication is that standards that receive greater attention in development by different stakeholders ultimately have greater impact.

"One reason my work is different from lots of other work is that I'm interested in information technology when it hits society," explained Kesan, who is an expert in intellectual property, especially regulation and policy for information technology. "Open standards are important because they make things like government records, documents, and government processes accessible to everyone. They're really part of recognizing that information technology and software make a lot of choices for us and influence things we care about, like security, privacy, and access to information. We need to understand how that happens."

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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Released January 31, 2008

University of Illinois at Urbana-Champaign