Four ITI Professors Win HP Innovation Research Awards

Four professors in the Information Trust Institute (ITI) at the University of Illinois at Urbana-Champaign were among 60 professors around the world selected to receive awards as part of HP's 2009 Innovation Research Program, which is designed to create opportunities for colleges, universities, and research institutes to conduct breakthrough collaborative research with HP. The ITI recipients included Professors Narendra Ahuja, Jiawei Han, Thomas Huang, and William H. Sanders.

"Our goal with this program is to collaborate with the brightest minds from around the world to tackle the industry's most complex problems and push the frontiers of fundamental science," said Prith Banerjee, senior vice president, Research, HP, and director, HP Labs. "Illinois has demonstrated outstanding achievement and a vision that will help inspire technological innovation and address the most complex challenges and opportunities facing the industry in the next decade."

Ahuja, who is a Donald Biggar Willett Professor in the Department of Electrical & Computer Engineering at Illinois, will collaborate with HP Labs on an initiative entitled "3D Reconstruction of Dynamic Real-World Objects and 3D Motion Aided Gesture Recognition." The work will focus on extracting three-dimensional descriptions of the real world, with specific applications to interpreting hand and body gestures made by humans in the scene. "The overall goal is to develop computer algorithms for automated interpretation of images supplied by a set of cameras," explained Ahuja. "The understanding is in terms of where the objects are, how they are shaped, their color appearance, and how they move about."

During previous collaborative research with HP, Ahuja developed the capability to reconstruct object surfaces in 3D while eliminating mirror-like highlights, removing undesirable shadows, and recognizing the color of the prevailing lighting. With the new award, he will use additional information available in a video sequence of stereo images taken from a pair of cameras, which themselves may be moving. "This will help us reconstruct a scene consisting of moving objects involving complex lighting, such as people moving across an office floor or rooms," said Ahuja. He plans to use the resulting advances to introduce a new level of realism to future video teleconferencing systems, such as HP's Halo system: "This will bring users' telecon experience one step closer to normal, face-to-face meetings."

Han, who is a Professor in the Department of Computer Science at Illinois, will work with HP on a new project entitled "PowerText: Exploration of the Power of TextCube in the High-Performance Analysis of Multidimensional Text Database," which will focus on data mining and multidimensional text database analysis technology. The goal will be to construct a set of tools for search, analysis, and mining of multidimensional text databases, and the work is expected to have an impact on many real-world applications that involve massive amounts of structured data linked with text data. The project will build on Han's existing collaborations with HP Labs researchers, as well as a long history of research results from the Computer Science Department's data mining group, which Han leads.

Huang, who is the William L. Everitt Professor of Electrical Engineering at Illinois, will work with HP

collaborators to address one of the major challenges in the field of computer vision: that of the so-called "semantic gap" involved in inferring high-level semantic concepts from low-level features. In his project with HP, entitled "Mining Image Semantics Using an Ontological Framework," he will explore the rich multimedia data available on the Web to meet this challenge.

Sanders, who is Director of ITI and a professor in the Department of Electrical & Computer Engineering at Illinois, won an award along with his collaborator Aad van Moorsel of the School of Computing Science at Newcastle University in Britain. They will work with HP Labs on a research initiative entitled "Prediction and Provenance for Multi-Objective Information Security Management," which will focus on prediction of information technology systems' compliance to ISO27k security guidelines while maintaining overarching business and security goals.

ISO27k is a family of information security management standards overseen by the International Organization for Standardization. Attempts to conform to the standards may affect other organizational and business goals of an organization. The new research project aims to address gaps in existing evaluation technologies by introducing new probabilistic and stochastic model-based prediction techniques, making use of the Illinois-developed Möbius modeling tool, that will allow IT managers to find out how well their systems conform to the standards and to determine the impact of that conformance on multiple objectives. According to van Moorsel, "This project is going to fill big holes in the research in this area. There are serious limitations to the existing standardized processes; it isn't clear how to implement all of the guidelines in the standards, and it's tricky to identify the best trade-offs among conflicting goals. Unfortunately, it can translate into serious problems in the real world. We're looking forward to working with HP to address a lot of the unanswered questions."

HP reviewed nearly 300 proposals from more than 140 universities in 29 countries on a range of topics within the eight high-impact research themes at HP Labs: analytics, cloud, content transformation, digital commercial print, immersive interaction, information management, intelligent infrastructure, and sustainability. More details about the HP Labs Innovation Research Program and worldwide award recipients are available at http://www.hpl.hp.com/open_innovation/irp/2009_results.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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