



Industry Reps Gather at Nichols

More than 80 invited guests took part in ITTC's Spring 2005 Research Overview for Industry on April 7. The Center's researchers highlighted their work in wireless and networking, intelligent systems, computer systems design, and bioinformatics and life sciences during four sessions.

"Many people in industry are not aware of the breadth of research going on at ITTC. I think this Overview day is a good way to promote ITTC within that community," says the Director of ITTC's Intelligent Systems Laboratory (ISL), **Susan Gauch**, who spoke on personalized searches based on user-search histories.

The Overview included its traditional student poster session, which showcased 33 research projects. Posters lined the atrium of Nichols Hall as industry representatives and students mingled. **Richard Stansbury**, a graduate student, said the event offered him an opportunity not only to make industry contacts but also to hone his communication skills.

"When you are wrapped up in research, you can easily lose the ability to convey your work in a simple and easy-to-understand manner," says Stansbury, who talked about robotics used on the Polar Radar for Ice Sheet Measurement (PRISM) project.



ITTC Executive Director Tim Johnson (left) presents long-time IAB member Brian Ruf with a service plaque. Ruf most recently participated in the industry review of ITTC's FY2005 internal technology commercialization projects.



IAB member Stan Pierson (middle) and Anil Dhonde (right), both with Aeroflex Test Solutions, look on as Ph.D. student Qi Chen describes his research.

Stan Pierson, project engineer with Aeroflex Test Solutions and an ITTC Industry Advisory Board (IAB) member, said he enjoyed his conversations with student researchers. He talked with graduate student **Ryan Reed** about the agile radio system, which is similar in concept to some of Aeroflex's newer test instruments. Based in Wichita, Aeroflex designs and manufactures wireless test instruments.

"I see the possibility for collaboration with ITTC to assist Aeroflex by researching new ideas and technologies ahead of our product development process," says Pierson.

The morning following the Overview, April 8, the Center held its annual Industry Advisory Board meeting. The group helps guide ITTC's research and development.

"What pleases me most about the IAB is the very symbiotic relationship it has with the Center. Industry and academia think differently—and both benefit from discussing their sometimes widely differing reactions to the same issue," says IAB member **Susan Norris** of Norport Technology Management Consulting.

During the meeting, Executive Director **Tim Johnson** recognized **Brian Ruf** of Ruf Strategic Solutions who has served the Center for more than 10 years as an IAB member.

ITTC faculty, staff, and students enjoyed yet another productive spring. Executive Director **Tim Johnson** and I both participated on committees that are helping direct the State's life-sciences effort. The Lawrence Biosciences Taskforce, of which I am a member, recently presented its strategic plan to the Lawrence City Commission. The Taskforce is working to develop bioscience industry resources and encourage, support, and sustain the industry's growth. For more on Tim's work on the Kansas Bioscience and Innovation Roadmap program, please see the picture to your right.



Director Victor Frost

Our new RFID Alliance Lab has released another tag performance report. The reports are generating both regional and national attention in our RFID capabilities. To learn more about the report, read the "RFID Alliance Lab Produces Second Performance Report" on this page.

In March, ITTC participated in the "KU in the Capitol Day," which showcased more than 40 different University programs or units. **Michelle Ward**, ITTC's public relations coordinator, talked to Legislators, state employees, KU staff, and students about the Center.

Research presentations, during the ITTC Technology Review for Industry on April 7, spawned discussion and ideas for future collaboration between industry and the Center. We were pleased that almost every project in the Center was represented in either the Overview or the student poster session.

The following morning, Industry Advisory Board (IAB) members participated in a lively discussion that sifted through various questions connected to the future of ITTC. Our success is no doubt in part due to the individual and collective contributions of our IAB members.

We are excited about our collaboration with KU's Office of Technology Transfer and Intellectual Property (OTTIP). ITTC will provide additional technical resources and expertise for transfer of software and information technologies for the Lawrence campus. This will give us an opportunity to learn about related activities and share our expertise with a larger group of KU innovators. For more information, please see the "Center Assists KU in Technology Transfer" article on page 4.

A number of graduating students who participated in ITTC research received honors at the EECS Banquet this spring. For a list of student honorees, log on to www.eecs.ku.edu/. We wish all of our graduates the best of luck and thank them for their work at ITTC.

Laying the Foundation



This spring ITTC Executive Director Tim Johnson (front) co- led the Health-Related Information Technology: Bioinformatics and Telemedicine "Hot Team." Industry, civic, and academic leaders developed strategic plans for the Kansas Bioscience and Innovation Roadmap program, which seeks to boost the State's burgeoning biosciences industry.

Team participants Mike Martin, of Johnson County Community College, and Gianfranco Pezzino, Kansas Health Institute, are to the left of Johnson.

RFID Alliance Lab Produces Second Performance Report

After performing more than one million read attempts on nine different models of radio frequency identification (RFID) tags, ITTC's RFID Alliance Lab has just released its second report, examining various aspects of tag performance.

The U.S. Department of Defense, Best Buy, Target, and Wal-Mart are requiring their suppliers to use RFID tags for inventory tracking. These tags, or microchips, contain tiny antennas that allow products to be tracked anywhere in their supply chain, "listening" for a radio query and responding by transmitting their unique ID code.

The Alliance Lab tested the performance of nine RFID tags based on EPCglobal's Class 1 and Class 0 specifications. The report, "UHF EPC Tag Performance Evaluation," details the tags' yield (what fraction of tags received will actually work) and variance (the difference in the performance among tags of the same model). It also documents how quickly tags can be read, both in isolation and when other tags are present.

For more information on the Alliance Lab or to purchase a report, please visit the Lab's Web site at www.rfidalliancelab.org/index.html.

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ITTC Builds One of KU's Largest Clusters

Conventional computers read a program and perform its instructions one after the other, serially. ITTC's new cluster, made up of 128 processors and 10 servers, permits researchers to fragment computations and perform them in parallel.

"Such division of labor permits the indexing and ranking of information on the World Wide Web, the analysis of genomes with billions of nucleotides, and undertaking many other challenging computations," says **Terry Clark**, assistant professor of EECS, whose research and teaching focus on parallel computing.

The ITTC cluster is a significant enabler of compute- and data-intensive research at KU. The tightly coupled cluster architecture allows efficient exchange of data between processors.

"The multiple machines housed in one location with dedicated communication between processors on a high-speed network makes it a powerful, integrated platform for researchers," says Clark.

ITTC staff and scientists recently began testing the system with compute-intensive applications. In tandem with these early users, ITTC system analysts continue to test the system with a variety of software, such as high-performance numerical packages.

"The early users allow us to test the cluster and develop a stronger and higher availability system when we bring it fully

online, which should happen by the end of the summer," says **Adam Hock**, senior systems administrator for the infrastructure.

The new infrastructure serves capably as a data warehouse with approximately 25 terabytes of storage and a petabyte-capacity backup system, providing hundreds of times more storage capacity than the file systems and allowing for robust and effective management of the data. The large local storage is needed for data generated from diverse projects such as those involving protein and DNA sequences and high volumes of mass spectrometry data generated at KU, for example.



Adam Hock, senior network systems administrator for the infrastructure, tests the cluster.

First Kansas Satellite Receives Flight Plan

by Pauline Himmelwright

ITTC researchers expect a July launch for what will be the first satellite designed, built, and launched into space by the state of Kansas.

The Kansas Universities' Technology Evaluation Satellite (KUTESat) program has developed a pico-satellite that will help accomplish space missions. The pico-satellite, known as a CubeSat, is a 10-centimeter cube that weighs less than 2.2 pounds. The CubeSat's standard design allows for information to be shared freely among satellite development teams.

Pico-satellites carried aboard larger spacecrafts may be used to inspect the main spacecraft and perform various other tasks. Fourteen CubeSats, including the one from KU, will be launched from Kazakhstan with a larger satellite.

Trevor Sorenson, associate professor of aerospace engineering, is in charge of the project.

"The University of Kansas has a world-class reputation as an aircraft design university, but we are relatively unknown in

space," Sorenson said. "This will help a lot for being able to attract more students, particularly graduate students that want to work in space —and, eventually attract more faculty."

Fewer than 50 universities around the world have started designing CubeSats. These universities consider the project an important tool for students to learn about spacecraft and space science while contributing to research.

Project manager and graduate student **Marco Villa** knows that the KUTESat program will help prepare students for future jobs. Students work alongside companies such as Honeywell, Swales Aerospace, the Kansas Space Grant Consortium, and the NASA Jet Propulsion Laboratory.

"We are working with real companies that are pushing us to meet certain goals in a certain time frame," Villa said. "This gives the students a chance to see what it's like in the real world."

Leon Searl, ITTC information specialist, also worked on this project.

Achievements and Acclaim

New NSF Center Resides in Nichols Hall

Housed in Nichols Hall, the new KU Center for Remote Sensing of Ice Sheets (CRISIS) will research polar ice and its potential contribution to sea-level rise. **Prasad Gogineni**, Deane Ackers distinguished professor of EECS, serves as the Center's director. The Center shares networking and computing resources with ITTC.

University of Kansas Promotes Alexander

Perry Alexander has received the rank of full professor this spring. Alexander, director of ITTC's Computer Systems Design Laboratory (CSDL), is with the EECS Department.

ITTC Alumnus Receives Tenure at UMKC

Cory Beard (Ph.D. EE, 1999) was awarded tenure from the University of Missouri-Kansas City. The former Self Fellow is an associate professor in the school of interdisciplinary computing and engineering.

Deavours' First Funded Student Graduates

ITTC Research Assistant Professor **Dan Deavours** saw his first master's student from a funded project graduate this spring. **Manivannan Elangovan** worked with Deavours on Bluetooth interoperability testing from the fall of 2003 to the spring of 2004.

Center Assists KU in Technology Transfer

ITTC and the Office of Technology Transfer and Intellectual Property (OTTIP) have joined forces to enhance their technology transfer and commercialization services for the Lawrence Campus. This collaborative relationship will provide additional technical resources and expertise for the transfer of software and information technologies for the entire Lawrence campus.

For the past several years ITTC's Office of Applied Technology has provided a large part of the technology maturation and commercialization effort for the technologies coming out of the Center. ITTC's efforts in technology transfer have yielded more than \$1 million in commercialization revenues returned to the University. In addition, the Center has been a catalyst for the formation of a number of start-up ventures.

But software and information technologies are developed through KU research projects across the entire campus—many in units outside the purview of ITTC.

“We have recognized the ongoing convergence of IT throughout the sciences and believe that together with **Jim Baxendale's** office we have an opportunity to leverage ITTC's expertise and resources by directly assisting the IT commercialization efforts throughout the University,” said **Keith**

Clark Co-Authors Textbook

Princeton University Press has published *Scientific Parallel Computing*, which is co-authored by **Terry Clark**, assistant professor of EECS. According to the Princeton Web site, it is the first textbook to integrate all the fundamentals of parallel computing in a single volume. For more information, please log on to the authors' Web site at amrit.ittc.ku.edu/spc/.



Address Service Requested.

Braman, ITTC's associate director for applied technology.

The new ITTC/OTTIP relationship also advances the Kansas Technology Enterprise Corporation (KTEC) mission by expanding ITTC involvement in IT technologies that are not otherwise associated with the Center. KTEC, which partly funds ITTC, is a state-owned corporation that promotes advanced technologies for economic development. KTEC funding allows ITTC to focus on technology maturation, commercialization, and economic growth within its core areas. ITTC researchers create fundamental knowledge and technologies required for the continued convergence of computing, communications, and sensors.

Under the new agreement, ITTC will also assist with technology evaluation, IP protection, marketing and licensing of KU software and information technologies developed outside of ITTC.