The Link

NEWS FROM Information and Telecommunication Technology Center

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ITTC Creates Software for Kansas Firm

Costas Tsatsoulis, director of ITTC Intelligent Systems and Information Management Laboratory (ISIML), and two ITTC graduate students have developed software to address billing challenges at the Burlington Northern and Santa Fe Railway Company (BNSF). The Kansas-based railway transports products into all states west of the Mississippi River, and Mexico. It must track numerous cars' movements and accurately chart accounts payable and receivable information.

The artificial intelligence (AI) software created at ITTC allows for a reduction in human error in the intricate billing system.

Tsatsoulis, along with graduate students **Todd Blackman** and **Brent Stephens,** designed a prototype for the company. The three have worked on the project since September, designing a case-based reasoning program that has the ability to apply

Graduate student Brent Stephens works on software he helped build for Burlington Northern and Santa Fe Railway.

Continued on page 4

ITTC Creates Software for Kansas Firm

ITTC received coverage this spring in *The Wall Street Journal*. Laura Landro's "Informed Patient" column discussed **Susan Gauch's** project Vitalseek and its ties to the American Healthcare Accreditation Commission. The article, published on May 23 in the "Personal Journal" section, asks why some people turn away from health information sites.

Landro writes about "Vital Decisions," a new survey by the nonprofit Pew Charitable Trust's Internet and American Life Project. She notes that six million people go online each day for medical advice, but only one-quarter follow the recommended guidelines and check a source's timeliness or accuracy of information.

Landro then goes on to talk about different health Web sites, including Gauch's project Vitalseek. Landro discusses the filters, created at ITTC, that allow vast amounts of medical information to be sorted. She then gives the example of people looking for information on children's asthma. With Vitalseek, users can specifically select results that have a higher degree of privacy protection, are not commercially sponsored, adhere to traditional rather than alternative medical practice, and so on. Gauch and her graduate students developed the Web site for Today Communications. Gauch said the plug in the *Journal* would attract more people to the new site.

"The hardest thing for any new Internet company is not developing the technology— it is getting people to discover the site," said Gauch, an associate professor in electrical engineering and computer science. "The mention in *The Wall Street Journal* gives Today Communications, Inc. the chance to show the world the technology we have developed together." ■

Director's News

The Center had its annual Industry Advisory Board (IAB) meeting in May. We were fortunate to have excellent attendance, as 28 Board Members took part in the day's events. The state of the Center was reviewed, and we discussed technology transfer activities as well as future challenges. It looks as if a major national research focus will be on the development of counter-terrorism technologies. Further, there is an increased emphasis on life sciences research.

Director Victor Frost

We expanded participation this year to include people involved with the life sciences, both in Kansas City and the University. This included **Arcady Mushegian,** director of bioinformatics at the Stowers Institute, and **Bill Duncan,** president of the Kansas City Area Life Sciences Institute. For the first time, an IAB meeting had external speakers: Mushegian and Duncan spoke about opportunities in the bioinformatics and life sciences fields. This stimulated a discussion on research opportunities in bioinformatics. It is interesting to note that **Dan Deavours,** an ITTC research assistant professor, did his dissertation research on stochastic petri nets, a methodology now being directly applied in molecular biology. Similar research may open doors to additional collaboration for ITTC and the life sciences community.

ITTC also had new members attend from the University community. **George Wilson,** Higuchi distinguished professor of chemistry and pharmaceutical chemistry, and **Gunda Georg,** University distinguished professor of medicinal chemistry and director of the Drug Discovery Program, participated in the discussion of new ideas in the burgeoning research that combines biology, analytic theory, mathematics, and computer science.

A trio of ITTC researchers highlighted the major new starts taking place at the Center. **Prasad Gogineni,** Deane E. Ackers distinguished professor of electrical engineering, discussed the PRISM (Polar Radar for Ice Sheet Measurements) project, while **Scott Hinton,** Deane E. Ackers distinguished professor, talked about the e-Learning Design Laboratory's project with Ft. Leavenworth. Assistant Professor **Ron Hui** presented his Wide Bandgap Semiconductors for Optical Communications research.

These exciting new projects were followed with presentations about major concepts under development and future research at the Center. The afternoon included a poster session for IAB members. They viewed 19 posters that students had made describing their projects. Members and students discussed the projects.

Since the meeting, we have begun to explore the topics suggested by our Advisory Board. We want to thank them for their time and commitment to ITTC and look forward to another productive event next year. ■

Ph.D. student **Juan Madrid** (left) explains his project, "Key Concept Conceptual Search Engine," to Industry Advisory Board Member **Brian Ruf** during a poster session in the Nichols Hall.

Mason, Francis Newest Members of ITTC Staff

Kelly Mason has been hired as the office specialist for PRISM. Her main duties include tracking the budget for PRISM and other projects. She earned her B.A. from Trinity University in San Antonio, Texas, and was a graduate teaching assistant at KU while working on her Ph.D. in English. After graduating in 1997, she moved to Austin, where she worked with the Texas Youth Commission. She is happy to be back in Lawrence again.

Kelly Mason

Annie Francis joined ITTC as an office specialist this spring.

Francis spent the last six years working for the Kansas Biological Survey in Nichols Hall. Prior to her work in Nichols, Francis spent 10 years in medical and biochemistry-related research. She has a master's of science degree in chemistry.

Annie Francis

Francis owns PianoNanna Studios and is a piano teacher and technician. ■

ITTC Professors Honored for Research, Teaching

A number of ITTC faculty received major awards this spring.

Gary Minden, professor of electrical engineering and computer science, earned the Miller Professional Development Award for Service. Minden received the honor for his work that promotes the University's reputation on a national scale. He has served on more than five distinguished technology advisory commissions, including the U.S. Commission on Spectrum Management.

Gary Minden

Minden has worked with the Department of Defense to develop policies on future research initiatives for communications and information technology.

"Service to the community, state, and nation is an important component of the university," Minden said. "I thank Dean Locke and the School of Engineering for recognizing this service."

Ron Hui, assistant professor of electrical engineering and computer science, received a Miller Award as well—the Miller Professional Development Award for Research. He has worked on numerous research projects at ITTC including acting as the sole principal investigator on eight projects that total $1.5 million. Since joining KU in 1997, he has filed for seven U.S. patents and written 11 journal papers and eight refereed conference papers.

Ron Hui

Chris Allen, co-director of ITTC's Lightwave Communication Systems Lab, said Hui deserved the Miller Research Award.

"Not only is Ron a very hardworking and intelligent colleague, he also has a wonderful sense of humor that makes working with him fun," Allen said.

Chris Allen was recognized for his teaching with the John E. Sharp and Winifred E. Sharp Teaching Professorship, which honors an outstanding educator. This award expands Allen's long list of honors already received for teaching and research at KU.

Juan Madrid, a Ph.D. student, has worked with Allen on ITTC projects and has had him as a teacher as well. Madrid said he was impressed by Allen's teaching ability from the start.

"Dr. Allen really cares about his students. He is always able to establish an excellent rapport with his classes by being supportive and demanding at the same time, and giving honest and timely feedback," Madrid said.

Chris Allen

Prasad Gogineni received the University of Kansas Louise Byrd Graduate Educator Award for 2002. The award honors a faculty member who demonstrates extraordinary devotion to graduate students and graduate education as well as distinguished scholarship.

ITTC Research Associate Pannirselvam Kanagaratnam nominated his mentor for the University award. He wrote that Gogineni has the ability to communicate complex ideas to students along with a genuine concern for his students' success. Kanagaratnam noted in his nomination letter that Gogineni worked with his graduate students late into the night, preparing radar systems for experiments. Kanagaratnam completed his Ph.D. this spring with Gogineni as his advisor.

"Dr. Gogineni was instrumental in helping me get the prestigious NASA Fellowship," Kanagaratnam said. "He explained to me what was required to write a good proposal as well as an excellent idea for the proposal. Dr. Gogineni also encouraged me to improve my writing skills by taking a technical writing class."

Prasad Gogineni

Gogineni also earned the Fulbright Scholar Award for his research in radar systems and remote sensing. As part of the award, he will conduct research at the University of Tasmania Antarctic Cooperative Research Center in Hobart, Tasmania. Gogineni plans to go to Australia at the end of July and return to Lawrence in mid-December. He will be on sabbatical for the duration of the next academic year and plans to spend the remaining time in Lawrence conducting research.

Bozenna Pasik-Duncan won the Frank B. Morrison Teaching Award from KU's College of Liberal Arts and Sciences. The mathematics professor received the honor for distinguished teaching that has greatly impacted the lives of her students.

She is affiliated with ITTC's Networking and Distributed Systems Laboratory (NDSL). This is only the second year for the honor, established by former chancellor Gene Budig and his wife Gretchen to honor Frank B. Morrison, former governor of Nebraska. Budig served as chief of staff for Morrison from 1964 to 1967.

Bozenna Pasik-Duncan

"I love students, and I always say that students have made me happy in this country," Pasik-Duncan said. ■

Artificial Intelligence Software Helps Company

Continued from page 1

previous experience to the billing process. Using this experience, the software can remedy any typos and adjust billing information to correspond with any changes in procedure. The ITTC computer program corrected 65 percent of the billing disputes. The information then is stored in a database.

Stephens, an Edgerton graduate student, said the problem was not as straightforward as they had first thought. The researchers had to interpret large amounts of data and find ways to make it useful, which required more investigation than originally planned, he said. The project went through several revisions with the students improving each model. Stephens had worked on a project similar to this, but the one at BNSF allowed him more tangible results, he said. He learned how the development process worked with a large non-computer company.

"In terms of software, we mainly adapted software from previous projects," Stephens said. "The greater work was done deciding what problem we were trying to solve and translating BNSF's knowledge into something we could work with."

A grant from the railway provided the necessary funding for the project. Stephens said he hoped that a version of the program would be developed and integrated into BNSF's accounting system. He said the company could build on the foundation that ITTC had created for them.

Blackman, an Overland Park graduate student, said he thought they had proven that the concept could work with their prototype. He added that he enjoyed using knowledge he gained in the classroom on an actual project.

"I found that getting good results from our efforts was a very good feeling," Blackman said. "Using any AI technique to solve a real problem interests me. It's exciting to apply things you've learned and found interesting at the time of learning." ■

Students Earn First Place in IEEE Paper Contest

Two ITTC students did what no KU sports team could do this year: they brought home a championship.

Travis Plummer and **Bharath Parthasarathy** won first prize in the IEEE (Institute of Electrical and Electronics Engineers) Region Five Student Paper contest in April. The duo wrote a paper on the development of a target simulator that tests the radar which maps the internal layers of the Greenland ice sheet. The undergraduates, aided by Prasad Gogineni, Deane E. Ackers distinguished professor of electrical engineering, created the simulator in the Radar Systems and Remote Sensing Laboratory.

Plummer and Parthasarathy developed a simulator project that enables researchers to ensure the radar's accuracy before taking it to Greenland for a NASA-funded study (headed by Gogineni) of polar ice and its relation to global climate change. It would be too expensive to take the radar to the ice caps just for testing. Researchers only travel to Greenland once or twice a year.

Thus, it is extremely important to know the radar will work before researchers journey to the north. They cannot test the radar within the continental United States, though, as it runs on the same frequency as wireless communication systems, including cell phones.

Travis Plummer and Bharath Parthasarathy hold their first-place certificates that they received in Houston. The two won the Regional IEEE Student Paper Contest this spring.

"It costs a lot of money for researchers to go to these kinds of remote places," Parthasarathy said. "But with the help of this target simulator, they can test the radar system they build in the laboratory, avoiding costly trips to places like Greenland; and then they can go only when they want to conduct experiments and get data from these ice sheets."

The ITTC team won $800, and its paper will be published in a book distributed to IEEE student chapters and libraries. The regional competition provides the highest level of competition, since there is no national contest. ■

Student Receives Prestigious NASA Fellowship

John Paden

Although **John Paden** will graduate with a master's degree from the University of Kansas this August, he is already at work on his Ph.D. His continual hard work paid off last week for him when he was awarded a NASA Fellowship.

The ITTC student earned one of 52 Earth System Science Graduate Student Fellowships for the 2002-2003 academic year,. for which NASA had 225 applicants. The award carries with it an $18,000 stipend and a $6,000 allowance for student and university expenses. The renewable three-year Fellowship recognizes Paden's contribution and makes it part of a larger enterprise—NASA's overall research efforts.

"I feel very honored to have received this award. I have been given tremendous support from both Dr. Allen and Dr. Gogineni. I am certain that without their continuing support throughout my master's career I would not have been able to receive this award," Paden said. "The stipend will allow both my wife and me to worry less about paying bills and more about our academic careers. Academically speaking, the award will undoubtedly help with other applications and help fund trips to conferences in my area of research."

Radar Systems and Remote Sensing Laboratory (RSL) Director **Chris Allen** said the award put Paden in an elite group.

"John Paden is an outstanding student who has distinguished himself academically and through his research," said Allen, one of Paden's faculty advisors. "By receiving the NASA fellowship, John joins a prestigious list of RSL graduates who have received NASA fellowships."

Paden submitted a six-page description of his proposed research entitled, "Development of a Monostatic/Bistatic Synthetic Aperture Radar System for Two-Dimensional Mapping of Basal Ice Conditions." The proposal included a detailed budget, a letter of recommendation from a faculty advisor, and background sketches for both the student and the advisor.

Paden's work will contribute to a larger project being pursued at ITTC under a grant from the National Science Foundation (NSF) and NASA. The project, known as PRISM (Polar Radar for Ice Sheet Measurement), aims to measure ice thickness and determine bedrock conditions below the ice sheets in Greenland and Antarctica.

PRISM, headed by **Sivaprasad Gogineni**, Paden's other faculty advisor and Deane E. Ackers distinguished professor of electrical engineering, will improve scientists' understanding of the interactions between ice sheets, oceans, and atmosphere to predict more accurately the probability of significant sea level rise.

"The PRISM project is fascinating to me on two levels," Paden said. "First, the project involves cutting-edge research involving a mix of practical hands-on experience and theoretical work. Second, I am very interested in the Earth's ecosystem and the consequences of our interaction with the environment."

More than 500 fellowships have been awarded since the NASA fellowship began in 1990. NASA created the program to increase the number of highly trained scientists and engineers in areas related to its mission: aerospace, space, and Earth sciences; space applications; and space technology.

Paden followed this national award with an ITTC honor. He was chosen as the first recipient of the ITTC Graduate Fellowship. He will receive $2,500 each year for a period of two years.

"We are very pleased to have John Paden as the first Ph.D. fellow," said **Victor Frost**, director of ITTC and Dan F. Servey distinguished professor of electrical engineering and computer science. "His recent NASA fellowship is a clear indicator of his ability to contribute to the state-of-the-art research in his field." ■

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Achievements and Acclaim

The Center employs more than 130 students who work in six state-of-the-art laboratories. The following ITTC students received degrees this spring.

Doctor of Philosophy: **Nathan Goodman**, electrical engineering,"SAR & MTI Processing of Sparse Satellite Clusters"; **Alejandro Parra-Briones**, computer science, "Performance Evaluation of Network Based Distributed Systems." *Master of Science, Computer Engineering:* **Sean Brumwell, Kelly Corn, Renzo Hayashi, Yoganandhini Janarthanan, Tsz Shun Lam, Ramu Naraparaju, Bhavani Shanmugam, Karthik Thyagarajan.** *Master of Science, Computer Science:* **Steve Ganje, Gayathrinath Nagarajan, Srinivasan Venkataraman, Pooja Wagh.** *Master of Science, Electrical Engineering:* **Sek Ken Chong, Yanki Cobanoglu, Chetan Khanna, John Reinke, Saeed Taherion, Jerome Thomas, Jr.**
Bachelor of Science, Computer Engineering: **Jason Bogner, Boon Chew, Doug Herbers, Daniel Herring, Dario Landazuri, James Mauro, Timothy Newman, Richard Stansbury, Mitchell Trope.** *Bachelor of Science, Computer Science:* **Xavier Stevens.**
Bachelor of Science, Electrical Engineering: **Justin Marz, Christopher Milligan, Shadab Mozaffar, Rohit Parthasarathy, Travis Plummer, Kevin Shepherd, Paul Valdez, Jr., Ledell Young, Jr.**

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Rosetta Takes Another Step Toward Industry Use

Perry Alexander's Rosetta project moved toward industry acceptance with its donation to Accellera. The not-for-profit group develops standards that allow different computer-based systems to use a variety of software. All major vendors, including Intel, Texas Instruments, and Motorola, belong to Accellera; and Alexander said that for industry to accept Rosetta, it had to be standardized. If industry doesn't buy in, he and his team were just wasting their time, Alexander added. But with the Accellera standard, most people within the computer industry will be able to use Rosetta easily. Alexander, an associate professor in electrical engineering and computer science, said he and others would spend the next year writing the standard

The project, named after tablets that cracked the code of Egyptian hieroglyphics, indicates that a fusion of many computer languages is possible. Until now, the systems industry has cobbled together existing but less suitable languages. Rosetta will allow designers to work with languages specific to their area and then adapt them to fit with other languages.

Cindy Kong, a graduate student working on Rosetta, said the donation to Accellera was crucial to the project's success.

"Accellera's involvement in the standardization of Rosetta is critical to Rosetta's popularity in the design community," she said. "It is a stepping stone to its success."

Rosetta will build a bridge of communication between designers. For example, cell phone developers must resolve differences between appearance and functional systems. People want a sleek phone that can be easily carried; at the same time, they want one with long-lasting battery power, Alexander said.

With the realization of this problem, Alexander began designing a language that would adapt to these different developers' needs. Alexander said it was difficult for developers to work with numerous languages, since certain terms can mean different things in different languages. For example, to a digital designer, a "bit" may be something very different from a "bit" in telecommunications. Rosetta allows for these languages to mesh together and achieve the overall goal of a project, whether it be creating a cell phone or a computer program.

Graduate student **Brandon Morel** said there had been many challenges in working on the Rosetta project.

"However, it is always exciting to be part of the avant-garde of new design concepts," he said.

Alexander began researching systems-level design languages at the University of Cincinnati. While the project started with just Alexander and a partner, it has garnered national and international support. Research laboratories such as Adelaide University and Manchester University now work on Rosetta, and it is used on four different continents. ■