Biodiversity Researchers to Gain New Searchable Database

University of Kansas researchers have received a $1.5 million grant from the National Science Foundation to develop a searchable online database and library that links the 50-plus volumes of the "Treatise on Invertebrate Paleontology," an important resource on climate change, evolution, and other biodiversity research.

"Treatise" classifies all known extinct and living invertebrates (creatures without backbones), which make up 95 percent of the animal species. Finding new ways to electronically extract, analyze, and store this authoritative compilation will lead to greater understanding of mass extinctions, evolutionary recoveries, and current environmental threats. An interdisciplinary team of researchers from ITTC and KU's Paleontological Institute will create the Invertebrate Paleontology Knowledgebase (IPKbase).

"IPKbase will help researchers more easily connect the dots," said **Xue-wen Chen**, director of ITTC's Bioinformatics and Computational Life-Sciences Lab and principal investigator of IPKbase. "The amount of information is overwhelming, and we are developing tools to help them mine data. By developing a fast and flexible online information repository, we will enable greater access to critical information."

Computational tools will extract and integrate images, text, and numerical data. For example, image-based searches would allow paleontologists to compare photographs of a newly discovered fossil with known images. New data analysis, modeling, and visualization techniques will discover patterns and provide meaningful interpretation. Finally, IPKbase will index information for easy retrieval and sharing.

ITTC investigator Xue-wen Chen, pictured above, is leading development of a searchable online database for KU's "Treatise on Invertebrate Paleontology." The 50 volumes classify all known invertebrates, including the moth shown above.

Moth Photo By Valerie Zona-Baxter.

ITTC researchers **Jun "Luke" Huan**, **Bo Luo**, **James Miller**, and **Brian Potetz** will be co-investigators on the project. **Paul Selden**, the Gulf-Hedberg Distinguished Professor of Invertebrate Paleontology, director of KU's Paleontological Institute, and editor of the "Treatise on Invertebrate Paleontology," will be a co-investigator as well.

"After half a century of scholars compiling and benefitting from this important repository of knowledge, today's researchers will have greater access to its knowledge through its digital presence and the incredible data mining techniques that our computer science colleagues are developing," said Dr. Selden. ∎

ITTC Researchers Named Elite Kansas Scientists

Two ITTC investigators have earned spots on a list recognizing the most influential scientists in the first 150 years of Kansas. Former ITTC Director **Victor Frost** and **Richard Moore**, founder of KU's Radar Systems and Remote Sensing Lab (RSL), are part of *Science in Kansas: 150 Years and Counting*.

The Ad Astra Kansas Initiative created *Science* to celebrate the Kansas Sesquicentennial and inspire young Kansans to continue producing innovations in STEM (science, technology, engineering, and mathematics) fields.

Dr. Frost, Dan F. Servey Distinguished Professor of Electrical Engineering and Computer Science, has conducted research on several prominent high-speed communications projects. From helping develop the information superhighway to establishing dependable Internet access for the first time in northern Greenland, Dr. Frost has helped transform how people communicate and the ease in which they access information.

After 20 years of administrative duties at ITTC and its predecessor lab, Dr. Frost stepped down as ITTC Director in 2008. He has just completed a two-year position as program director within the Computer and Information Science and Engineering Directorate at the National Science Foundation. While at NSF, Dr. Frost helped set the national research agenda for future networks.

EECS Professor Emeritus Moore was a pioneer in the field of microwave-based satellite remote sensing. He helped revolutionize mapping and monitoring of the Earth's surface through satellite-based remote-sensing. His radar systems track climate changes including identifying hurricanes and other storms in their early stages. Dr. Moore's innovations are now used worldwide.

Throughout 2011, Ad Astra will be highlighting Kansas scientists and their contributions. To learn more about the honorees, go to www.adastra-ks.org/events/150_scientists_index.html. ■

Measuring Success
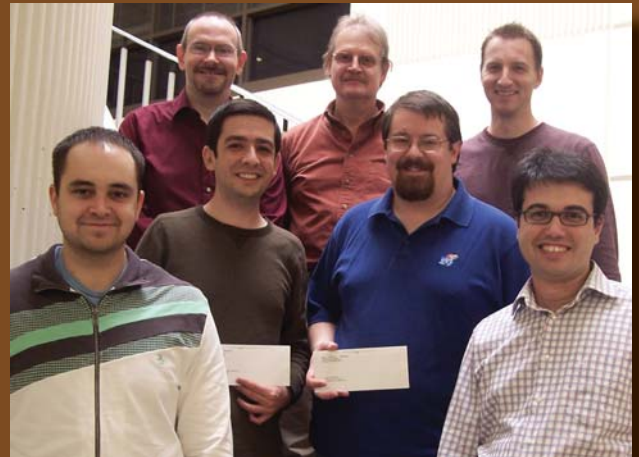
(Back row) ITTC investigators Andy Gill, James P.G. Sterbenz, and Erik Perrins were recognized by the International Foundation for Telemetering (IFT) for their research to improve measuring at a distance, or telemetering. This summer IFT named KU a partner university and donated $60,000 to ITTC, allowing for the creation of IFT fellowships. The first IFT fellows were announced this fall. (Middle Row) Ph.D. students Ehsan Hosseini and Justin Rohrer and (Front row) EECS graduate student Tristan Bull and EECS Ph.D. student Egemen Cetinkaya each received a $1,000 fellowship.

Under the direction of ITTC investigators, IFT fellows are helping develop a NASA deep-space communication system with severe size constraints, a wireless networking system designed for test aircraft, and other telemetry research. The systems will transmit large amounts of data while adding new capabilities. ■

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"During my time at ITTC, I have worked on the SensorNet project. In the first phase, we studied how to operate a sensor network—say for monitoring a sporting venue—when there are different data owners. We then developed an open source software for sensor networks that could monitor cargo in motion, reducing supply chain theft. Through these projects, I received opportunities to leverage my education by solving real-world problems.

—Daniel Fokum, Ph.D. student

Agah Receives ING Excellence in Teaching Award

Arvin Agah, director of ITTC's Intelligent Systems Lab, received the 2010 ING Excellence in Teaching Award during the home football game against the University of Colorado on Nov. 6.

Dr. Agah does an extraordinary job of combining ITTC's core mission of research, education, and technology commercialization.

"Professor Agah always finds challenging projects that force students to think for themselves and truly learn the material in order to succeed. His role is often as a mentor who guides students toward success but never simply hands them the solution," said **Richard Stansbury**, who had Dr. Agah as a professor and advisor as an undergraduate, graduate, and doctoral student at KU.

Highlights from Dr. Agah's classroom projects include a robot sumo wrestling competition in which student teams developed, built, and programmed a robot able to force fellow classmates' robots outside a 5-foot wide "wrestling mat." He refereed the 72-match round-robin tournament that was the final project for his Robot Intelligence course in 2008. Dr. Agah's students won first place in the multi-university Cerner Corporation Software Design Competition in 2006. The Software Development Lifecycle course, which took place at ITTC, required students to develop software that could present, collect, and analyze patient information on a specialized PDA for health care providers.

KU graduate **Shannon Skoglund** is among the Perceptive Software staff that is co-teaching a graduate course on software engineering with Dr. Agah.

Arvin Agah, director of ITTC's Intelligent Systems Lab, received the ING Teaching Excellence Award during the KU football game on Nov. 6. Provost and fellow ITTC researcher Jeffrey Vitter (right) helps present the award.

Photo by Edward Kennington/University Relations

"I'm very impressed with Professor Agah's willingness to reach out to companies in the area and try innovative ways of teaching a class," Skoglund said. "I think the real-world exposure is both rare and very valuable in a university setting."

This is the eighth year that the ING award has recognized outstanding teaching on the Lawrence campus. The global financial institution offers banking, investments, life insurance, and retirement services to more than 85 million clients. ∎

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External Review Finds ITTC to be a Thriving Research Center

1 TTC is a thriving research center that supports high quality research and successfully collaborates with industry and commercializes technologies, according to an external review conducted this fall.

The review was part of a five-year assessment coordinated by the KU Center for Research, Inc. Leading researchers in ITTC's core areas served on the external committee: **Shiu-Kai Chin**/ Syracuse University, **James Kurose**/ University of Massachusetts at Amherst, and **Roy Yates**/Rutgers University. In October, reviewers met with Research & Graduate Studies executive staff, ITTC Directors, senior and junior faculty investigators, staff, and external collaborators.

Reviewers recommended leveraging the breadth of ITTC expertise and possible research collaborations available across KU to pursue larger Center-wide funding opportunities. Such interdisciplinary efforts are needed to help solve complex problems, such as finding the causes of cancer and developing more secure wireless communications for the military.

Reviewers highlighted the growing role for ITTC within high performance computing (HPC) at the University. The ability of ITTC staff to successfully operate and maintain HPC clusters, including the expanding Bioinformatics Core Facility, will increase KU's competitiveness in life sciences, climate change, and other research reliant on supercomputing.

ITTC researchers were commended for regularly evaluating the Center's areas of expertise. Information assurance/cyber security and bioinformatics are among the focus areas added over the last decade.

ITTC faculty, staff, students, and collaborators displayed broad satisfaction with the Center. This is in no small part due to the dedication and vision of ITTC Director **Perry Alexander**. Interviewees cited his management of ITTC and positioning it to be a driver of research computing at KU. While it was not a performance review, the review showed Dr. Alexander's leadership helping ITTC to continue as a well run and vital research center at KU. ∎