NC STATE UNIVERSITY

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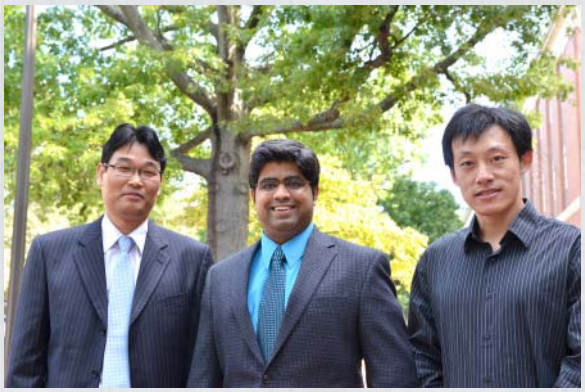
EDWARD P. FITTS DEPARTMENT OF
INDUSTRIAL AND SYSTEMS ENGINEERING

*in*Gear

ISE Welcomes Three New Faculty Members

This semester, ISE has welcomed three new faculty members to the department. Joining the team are Professors Yunan Liu, Chang S. Nam, and Rohan Shirwaiker. Each new faculty member brings something fresh and exciting into the department.



Left to right: Dr. Nam, Dr. Shirwaiker, Dr. Liu

Dr. Yunan Liu joins us as an Assistant Professor having completed his Ph.D. in Operations Research earlier this year from Columbia University. His research is focused on queueing theory, applied probability and stochastic modeling, with applications to service systems, especially call centers, healthcare systems and manufacturing systems. Keep an eye out for his journal article in *Operations Research* titled "A Network of Time-Varying Many-Server Fluid Queues with Customer Abandonment" to be released late 2011.

Dr. Chang S. Nam comes to us from the University of Arkansas, where he was an Associate Professor. During his time at the University of Arkansas, he received several awards including an NSF CAREER Award (2010), as well as Outstanding Researcher Award (2010-2011) and Best Teacher Award (2010-2011) from Arkansas. He teaches and conducts basic and applied research in human factors and ergonomics engineering to advance the science of Human-Computer Interaction (HCI) with a broad prospective on the application of systems and information engineering to human-centered technologies, including healthcare systems and rehabilitation engineering. Dr. Nam received his Ph.D. in Industrial and Systems Engineering from Virginia Tech in 2003.

Dr. Rohan Shirwaiker received his Ph.D. in Industrial Engineering from Pennsylvania State University in 2011, and he comes to us as an Assistant Professor in the biomedical manufacturing thrust area. He studies the design, fabrication and characterization of functional biomedical surfaces utilizing alternative antibacterial materials. His current research projects focus on the characterization and parametric modeling of silver ion and nanoparticle-based antibacterial surfaces with micro and nano-scale physical and electrical design features.

ISE Students Make the Headlines

When students take their senior design course they know that they are going to get some hands-on job training, improve their networking skills, and apply many of the tools they have learned during their degree program. ISE students are now getting more recognition for their work thanks to the industry sponsorship by over 15 companies in the past year. The *Triangle Business Journal* has featured two articles on projects that our seniors have worked on over the last semester.

Students working on a project

In anticipation of this fall semester, TBJ highlighted students completing projects sponsored by Rex Hospital, Caterpillar, and Ingersoll Rand. In hospitals like Rex, cutting inefficiencies in the way tests are scheduled and patient care are delivered saves not only money but impacts the patient experience. This semester's team will be using value stream mapping and activity based costing to analyze patient processes from arrival to admission to a unit.

Another design team is working with Caterpillar at their Sanford fabrications plant looking for ways to improve material flow into and within the facility. With the start of production in a new facility this team has had a great opportunity to gain first-hand experience with facility transitions.

These student-company alliances aren't just for the students' benefits, either. Companies find great value in their student employees. In fact, two students found employment at the companies they worked with after their graduation.

ISE Officially in the Top 10

The Edward P. Fitts Department of Industrial and Systems Engineering is now officially one of the top ten undergraduate industrial engineering programs in the nation according to the 2012 release of the *US News & World Report's* top colleges list. Over the last three years the department has moved from #18 to #10 on this list.

Employers have recognized the value of an ISE education for many years. An NC State College of Engineering survey of recent graduates found the department ranked #1 in employment and #1 in employment in the field. Our recent alumni also ranked ISE #1 in student satisfaction.

ISE Ph.D. Student Receives AHRQ Dissertation Grant


Doctoral Student Jennifer Mason

Jennifer Mason, a Ph.D. student in ISE has received an Agency for Healthcare Research and Quality's (AHRQ) prestigious doctoral dissertation grant. The AHRQ is a part of the U.S. Department of Health and Human Services (HHS), and its members provide extensive health services research, specializing in major health care areas such as quality improvement and patient safety, outcomes and effectiveness of care, clinical practice and technology assessment, and health care organization and delivery systems.

Jennifer received a Masters degree in Operations Research in 2009 from NCSU. She now works along with Dr. Brian Denton, focusing on medical decision making applications. Her dissertation involves the study of optimal treatment decision to manage cardiovascular risk for patients with type 2 diabetes. Her research has developed new findings about the optimal time to initiate cholesterol and blood pressure medications over the course of a patient's lifetime, considering the tradeoff between the benefits and side effects of treatment on a patient's quality and length of life. In addition, Jennifer's research considers the impact of poor adherence and ways that Industrial and Systems Engineering methods can be applied to find optimal intervention strategies to improve adherence once a patient has started taking a medication.

Council on Competitiveness

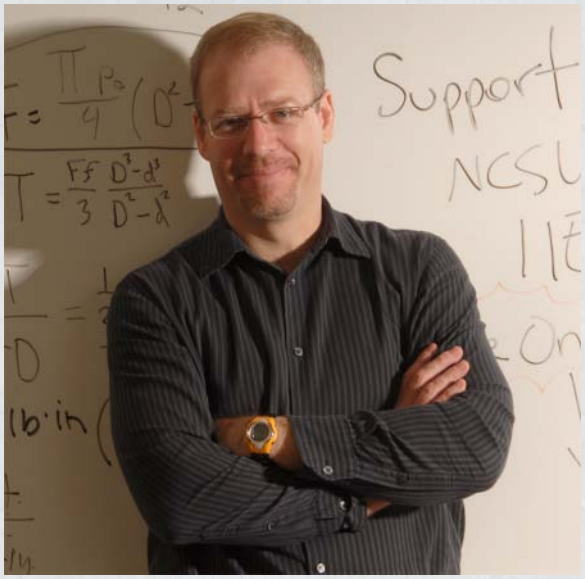
What attracts businesses into the United States? That's a task that the Council on Competitiveness works hard to answer. ISE's Dr. Thom Hodgson serves as an advisor to Chancellor Woodson and meets along with the council about four times a year. The council is a non-partisan and non-governmental organization whose members consist of CEOs, university presidents, and labor leaders.

The goal of the council is simple: to ensure U.S. prosperity. The future of prosperity in the U.S., according to the council, is tied closely with revitalizing the manufacturing sector as well as continuing to be a leader in high performance computing. The council also publishes the Competitiveness Index, which is a tool used to measure how America is competing along with the rest of the world.

"We work up position papers that eventually get to the White House, Senate, and House," says Dr. Hodgson of the council. This is the second year that Dr. Hodgson has contributed to the studies. He says often times members will tour company plants to better understand the processes business undergoes, which is a unique experience in itself.

Dr. Kaber Named HFES Fellow

Dr. David Kaber, Professor of Industrial & Systems Engineering, was recently elected Fellow of the Human Factors and Ergonomics Society (HFES) and was recognized at the 55th Annual Meeting of HFES in Las Vegas, Nevada (September 20, 2011).



ISE Professor David Kaber

Kaber was selected for this honor based on his research contributions in the areas of human interaction with automated systems, human-computer interface design and evaluation, and virtual reality (VR) design for task simulation and training. He developed a hierarchy of levels of automation in complex systems (from manual control to fully autonomous operation) in order to describe human performance, mental workload and situation awareness consequences of automation design. Through a series of experiments, he demonstrated intermediate levels of automation (blending human and machine control) to reduce operator workload and maintain situation awareness in the context of radar monitoring, remote robot control, and aircraft piloting.

Kaber also developed design guidelines for automation that adaptively changes states based on human operator workload. He empirically demonstrated effectiveness of real-time measures of operator performance for determining appropriate modes of adaptive automation in complex systems. He also demonstrated use of measures of human situation awareness for identifying benefits of adaptive automation over full automation. In the context of air traffic control-related tasks, he showed variable performance effects of adaptive automation in support of different stages of human information processing. In telerobot control he demonstrated effectiveness of auditory and visual signals on adaptive automation assistance of operators in terms of performance and situation awareness.

Regarding user interfaces, Kaber developed novel methods for design and usability evaluation, including a metaphor-based approach to intelligent displays for high-throughput screening systems, use of cognitive task analysis to define supervisory control interface content for automated life science processes, extension of human-computer interface usability evaluation methods to the aircraft cockpit and approaches to usability in cockpit interface design. Most recently, Kaber used computational models of human performance for assessing the usability of interfaces in life science automation.

In the area of virtual reality, Kaber developed a theory of remote human (tele) presence in computer-generated environments. He received the Jerome H. Ely Award from the Human Factors & Ergonomics Society and a CAREER award from the NSF for this research. He demonstrated the utility of measures of user awareness of virtual environments for quantifying presence experiences. He also quantified implications of automation applied to telerobot control on operator presence experiences in using VR-based control interfaces. He also assessed the effects of VR design incorporating visual, auditory and haptic stimuli on presence experiences as well as the relationship with performance. More recently Kaber has studied the use of VR for facilitating motor control task training and performance assessment, including locomotion and surgical procedures.

Health Systems Engineering Certificate Program

The ISE department is now offering a certificate in Health Systems Engineering to prepare students for careers in the health systems industry. The certificate program is available to both undergraduate and graduate students in industrial and systems engineering. The program is a result of the department's commitment to the health systems area and based off of conversations with potential employers.

ISE Professor Stephen Roberts

There are three elements to obtaining the Health Systems Engineering certificate. The first is a summer internship with a company sponsor where students are able to get real world experience in a hospital or related health systems company. Students then go on to take two courses - Health Care Performance I & II. The first course provides background into the healthcare system while the second course allows students to complete is a project for a healthcare provider or related company. For undergraduates the project course substitutes for their senior design requirement.

In the spring of 2011, the first six students received the Health Systems Engineering certificate -- three were graduate students, three were undergraduate. "We are among one of the first universities to offer this type of certificate," says ISE Professor Stephen Roberts.

The program offers even more than the valuable hands-on experience a student gets with their internship and classes. Once accepted into the Health Systems Engineering programs, undergraduate students are offered a $2,000 scholarship, and graduate students have their student fees paid for them.

www.ise.ncsu.edu