The Edward P. Fitts Department of Industrial and Systems Engineering at NC State is pleased to welcome Dr. Richard A. Wysk as the Dopaco Distinguished Professor beginning in January. Professor Wysk is currently the Leonard Chair in Engineering at Penn State University and one of the most recognized industrial engineers. Over his career, he has produced seminal work in advanced manufacturing and now focuses on developing new rapid manufacture processes for biomedical devices and developing a new generation of technologies to make medical implants antibacterial.

Professor Wysk is widely established as the leading expert in computer integrated manufacturing and one of the most respected industrial engineers globally. His speaking engagements and keynote addresses span four continents and he has been elected a Fellow of the Institute of Industrial Engineers and Society of Manufacturing Engineers. He is highly visible in the research community, working with a variety of professional societies in leadership roles, including Editor-in-Chief of all Society of Manufacturing Engineers’ journals. He is well regarded in the educational community for his groundbreaking text books that are used internationally.

Professor Wysk has produced over 170 refereed papers in areas of computer-aided process planning, manufacturing control systems, and computer integrated manufacturing, as well as 15 books and numerous book chapters. His research in computer-aided process planning is the seminal work in the field and often cited. Moreover, it spawned the original industrial systems that have evolved into what is widely used today. This work seeks to take digital representation of products and components and optimize their production with no (or limited) human input. Over the last two decades, the results have literally driven many productivity gains. His research in manufacturing control systems uses state space graphs to automatically configure control software for automated manufacturing systems. As with his work in process planning, this is the most heavily cited work in this area and the basis for a great deal of the control software currently implemented industrially. His efforts have been well-supported from government agencies and industry including operations outside the U.S.

His current research uses his process planning and optimization results to develop new means of rapid prototyping and manufacture. This innovative work is applied mainly to biomedical components and devices. He has also developed a technology for fabricating medical implants and other devices that will render them bactericidal through the electrical stimulation of silver. One can envision a new generation of human implants where his rapid manufacture technique is used to fabricate an implant customized for the recipient that is then treated to prevent infection.

Professor Wysk has also had significant impact on student learning through the development of new ways of teaching and subsequent papers and presentations on his collaborative work. His investigation into new approaches to teach creativity and hands-on education has been funded and he has several papers on these activities, including one that has won a best paper award. He is a dynamic teacher and has advised over 70 graduate students during his career, including successful engineers, managers and academicians. Among his former advisees are NSF PYI/CAREER Award winners, department heads, deans and university vice presidents.

Upon joining the NC State ISE faculty in January, Professor Wyak noted he will continue his focus on medical devices, with an emphasis on antipathogenic treatments and mass customization.
Dr. Dong’s research interests include micro/nano manufacturing, as well as multi-scale mechatronics and manufacturing systems. His work to develop micro/nanomanufacturing systems also includes necessary instrumentation, sensing, control and optimization. He has developed various multiple-dimensional scale manufacturing platforms utilizing novel kinematic mechanisms. This work includes conventional-scale high-speed machine tools, meso-scale nano-positioners, and micro-scale microelectromechanical-based (MEMS) positioning and manipulation devices. In his research, advanced sensing and control techniques are integrated with multi-scale manufacturing systems to obtain optimized performance. The resulting high performance manufacturing systems have been applied to several applications including micro/nano manipulation and manufacturing, biomedical manufacturing, and bio-testing and characterization. Dr. Dong’s research will enable the scale-up of required for nanomanufacturing.

In Dr. Dong’s research group, meso-scale nanomanipulators have been developed with ultrahigh-bandwidth (Figure 2). Such nanoscale manipulators are used with micro-cantilevers for high-rate metrology (e.g., video-rate imaging in cell biology for tracking transient biological events), and novel nano-scale machining processes. Additionally, Dr. Dong’s group is exploring the use of MEMS devices in nanomanufacturing and metrology applications with the objective of creating flexible manufacturing systems at a small scale. New methods and architectures are being investigated for heterogeneous integration of MEMS positioning platforms with functional interchangeable nanomanufacturing tool bits (analogous to the tool changer on a CNC machining center) which will permit flexible nanomanufacturing. Such MEMS scale devices will also be used for other applications including materials characterization and bio-testing.

Another research direction pursued by Dr. Dong’s group is scalable high-rate manufacturing of tissue engineering scaffolds, an artificial structure capable of supporting three-dimensional tissue growth as might be used for regenerative medicine. By integrating conventional-scale motion platform, nanopositioning systems, and micro-fabricated nozzles, ultra-precise (100 nm to 5 μm) polymeric scaffolds can be fabricated using a multi-nozzle-based parallel printing processes. The manufacturing platform and process enables high-throughput fabrication of a new-generation of scaffolds with multiple materials and functions that can be integrated with in place sensing and stimulating capabilities.

Later this month, the Edward P. Fitts Department of Industrial and Systems Engineering will hold a luncheon reception to honor its fourth group of Distinguished Alumni, as well as students, faculty, and staff. The Distinguished Alumnus Award is the highest honor the Department can bestow upon any graduate and is presented to individuals whose contributions to their profession, community and the Department, College and/or University are notable and merit special recognition.

With the arrival of a new faculty member who adds to our expertise in biomanufacturing, along with our esteemed group already in place, and the promise of a new building, the Department is poised for continued trajectory and enhanced reputation as an academic and industry thought leader.

We believe the 2009-10 academic year will prove to be one of continued breakthroughs and accomplishments. Our group of distinguished alumni is representative of what can be achieved. Alumni interested in reading about the ceremony and inductees should check the ISE Web site later this month.

Figure 1: Micro scale active cantilever device with XY stage enables nanoscale manipulation. The compact size of the miniaturized MEMS device enables large array based parallel processing.

Figure 2: Meso-scale ultra-bandwidth nanomanipulator for high-rate metrology and video-rate imaging.
HODGSON NAMED CO-DIRECTOR OF INTERDISCIPLINARY OPERATIONS RESEARCH PROGRAM

Dr. Thom J. Hodgson, James T. Ryan Professor and Distinguished University Professor, was named as the Co-Director of the Interdisciplinary Operations Research Program. He succeeds Yahya Fathi, Professor of Industrial and Systems Engineering, in this position. Dr. Hodgson has served as Head of the Industrial Engineering Department at NCSU (’83-’90); Director of the Division of Design and Manufacturing Systems at the National Science Foundation (’91-’93); Professor of Industrial and Systems Engineering at the University of Florida (’70-’83); Operations Research Analyst at Ford Motor Company (’66-’70); and an Officer in the U.S. Army (’61-’63). He is a Fellow of IIE and INFORMS, and a member of the National Academy of Engineering. He has also received the Albert G. Holtzman Distinguished Educator Award and Frank and Lillian Gilbreth Industrial Engineering Award from the Institute of Industrial Engineers.

Dr. Hodgson is the author or co-author of numerous journal articles and book chapters in scheduling, production and inventory control, manufacturing systems, and military operations research. He has served as Associate Editor, Departmental Editor (‘81-’84; ’88-’91), and Editor-in-Chief (’84-’88) of IIE Transactions. He also served as a member of the U.S. Army Science Board (’94-’00).

NCSU ISE TO HOST GRAND CHALLENGES WORKSHOP

The Edward P. Fitts Department of Industrial and Systems Engineering will host a workshop entitled “Educating Industrial and Systems Engineering Students to Meet the NAE Grand Challenges” in December 2009. Building upon the work of the NAE to identify the Grand Challenges, this workshop seeks to identify how industrial and systems engineering can contribute to these challenges through its research and education of students. The intent of the workshop is not to redo the outstanding work done by the NAE and others in examining the future of industrial and systems engineering. Instead, it is to clarify our fit, as a profession, with the Grand Challenges and how to better prepare our students to meet these challenges. Fourteen challenges were identified by the NAE falling into four broad categories: promoting sustainable technologies, advancing human health, reducing vulnerability to threats (natural and man-made) and “increasing the joy of living.” Industrial and systems engineers have a rich history in making contributions to problems of technical, as well as societal, importance and have a unique opportunity to continue to do so.

The workshop will produce an initial report that will be widely communicated to the community, including other NAE Grand Challenge workshops, for input. Forums at national meetings as well as electronic input will be used to modify the final report for distribution.

The workshop is being locally organized by Thom Hodgson, James T. Ryan Professor, Distinguished University Professor and a member of the NAE; Reha Uzsoy, C.A. Anderson Distinguished Professor; Clarence Smith, Assistant Department Head; and Paul Cohen, Edgar S. Woolard Distinguished Professor and Department Head.

NCSU ISE is socializing!

The Edward P. Fitts Department is proud to announce we have taken the plunge into social media. Using a variety of online social platforms, the Department will announce recent news, follow trends, remind followers of upcoming events and interact with industry peers. In addition to connecting with those who are already aware of the Department and ISE in general, postings will also spread the word to new audiences. We have pages on Facebook and Twitter, as well as photos on Flickr and videos on our dedicated YouTube Channel. So stay in touch! Take your friendship with the Edward P. Fitts ISE Department online and let us know what you think.
ISE GRADS GET LinkedIn

Whether you graduated in ‘62, ‘92, ‘02 or some other fine year, we’d love to get reconnected with you. Please consider joining the Edward P. Fitts Department of Industrial and Systems Engineering group on LinkedIn, the professional networking site. LinkedIn is a way to network, ask questions, reconnect with classmates, and help other alumni.

By joining our group and reaching out to other NC State ISE grads, you will be strengthening our alumni network, which helps us all succeed. To join, please visit our LinkedIn Profile or send an email to Assistant Head Clarence Smith at csmith@ncsu.edu or 919.515.6416. You can also contact Lori Richards, director of development at lori_richards@ncsu.edu or 919.513.1338.

CHECK US OUT ON...

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