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Department of Industrial Engineering

Clemson and GE Make Safety a Priority for Sustainable Technologies

There is no room for acrophobia when you are climbing one of GE Wind's 100-meter wind turbines. IE Ph.D. student Katie Berry, along with Clemson Chemical Engineering Alumni Kavitha Arms, learned that during a recent climb at a wind farm located near Pittsburgh in Summerset, PA. Along with Drs. Shappell and Stringfellow, Berry is working with GE to evaluate safety data for its wind turbine maintenance technicians using HFACS, an accident classification framework.

To gain a better understanding of the working conditions on a turbine, Berry accompanied Arms to the wind farm. During the visit, they were able to experience first-hand the daily demands of servicing the 100-meter towers. "The climb was probably the most scary and the most fun thing I have ever done!" said Berry.

Since GE maintains wind fields across the U.S. and the world, the implications of this research reach far beyond Summerset. With the findings from this work, GE hopes to improve the maintenance safety of its wind turbines.



Kavitha Arms, a Clemson Alumnus now with GE Wind (left), and Katie Berry, an IE Ph.D student (right), show their orange allegiance as they investigate safety issues at one of GE's wind farms outside of Pittsburg, PA.

Clemson To Unveil Online M.Eng. in IE Program

Supply Chain and Logistics in Capital Projects

The Department of Industrial Engineering is pleased to announce the development of a Master of Engineering (M.Eng.) Degree with a concentration in Supply Chain and Logistics. Specifically, this degree focuses on the engineering and construction of capital projects, combining theory with practice to broaden student understanding of the entire project lifecycle.

Because of the interdisciplinary nature of these issues, courses are being developed in collaboration with the Departments of Civil Engineering and Management at Clemson as well as with appropriate businesses, contractors and suppliers. All 10 courses will be taught using an asynchronous format, meaning that students will be able to participate from anywhere with no on-campus attendance requirements. Given this program's unique focus, its graduates will have the strategies for tackling supply chain and logistics issues using the latest tools and technologies.

Currently under the final stages of curriculum approval, the M.Eng. Program is scheduled to commence in Spring 2009 following approval. If you would like to receive more information about the program, please contact Dr. Bill Ferrell at fwillia@clemson.edu.

IE Faculty Leads Hurricane Evacuation Research

Catastrophic flooding. Evacuations. Lost Lives. Slow response. These terms are all too familiar given the hurricane seasons of recent years. Hurricane Katrina, along with other natural disasters, has revealed a number of valuable lessons to be learned regarding disaster preparation and relief efforts. And, Clemson University is taking action. Dr. Kevin Taaffe, an Assistant Professor in IE, is leading a team to investigate policy improvement procedures during hospital evacuations. During Katrina, many hospitals and health care facilities faced tough decisions such as which patients should be relocated to other sites and whether or not certain patients should be sheltered at their current hospital. Through his research, Taaffe hopes to provide hospitals with quantifiable information to better their evacuation strategies.

Message from the Department Chair



We are proud to announce a wealth of new growth and achievement in the Department of Industrial Engineering this year; some of these recent happenings are highlighted in this issue of the newsletter. The Department has a new Institute of Supply Chain, Optimization and Logistics (CISCOL) www.ces.clemson.edu/ie/ciscol.

Student enrollment in our programs is on the rise: we now have 175 undergraduate and 75 graduate students reflecting excellent diversity, a testament to the efforts taken to improve our program. Our students and faculty continue to earn international recognition for their research. On a programmatic note, we will unveil a new on-line M.Eng. in Industrial Engineering program focusing on the capital project supply chain.

As always, we sincerely appreciate the most generous support of our alumni and friends and their continued contributions to the Department. Finally, please don't hesitate to stop by and see us if you are in the Clemson area.

Dr. Anand K. Gramopadhye

Mining Accidents Down-Under

To date, little research has been conducted on the causes of human error in mining. With its inherent risks associated with mining, preventing errors before they occur results in a reduction in injury, property damage, and death. In order to correct and prevent future incidents and accidents from occurring, it is important to discover their underlying causes so they can be either reduced, eliminated or their consequences mitigated. A recent project underway now aims to unravel the face of human error associated with Australian mining accidents/incidents.

To accomplish this, past data from mines across Queensland, Australia, are being analyzed using the Human Factors Analysis



IE student, Jessica Patterson, conducts her Ph.D. research on-site in Queensland, Australia Mines

Clemson Professor Retires after 22 Years of Teaching and Research

Long-time faculty member Dr. Del Kimbler recently retired from his position as a Professor of Industrial Engineering. Kimbler served the Department for 21 years before retiring in May 2008. During his tenure, Kimbler served as Department Chair, ran student research labs, and participated on more than 35 student committees. Now a Professor Emeritus, Kimbler enjoys spending time pursuing his true love, photography. Most recently, he accepted the position of Official Photographer for the city of Clemson.



Improving Health Care Delivery Through Industrial Engineering



CMH RN Susan Fendley (left) shows Dr. Garrett (center) and Sarah Grigg (right) how hospital staff interact with the mechanical blood pressure monitor.

Dr. Sandra Garrett's research in human factors focuses on applications in health care and natural disaster mitigation. Since arriving at Clemson last August, Dr. Garrett and a team of students have been working with Cannon Memorial Hospital (CMH) in Pickens, SC, to help improve patient care delivery capabilities through an analysis of workflow and space allocation. This three-phase project will study the current use of space and the hospital's immediate needs, offering strategic planning for future expansion or reorganization. As the Clemson-CMH partnership enters its second year, the focus is shifting to an analysis of the interactions and relationships between departments to help CMH more efficiently allocate its available space. In addition, Garrett plans to begin work on a second project with two other regional hospitals this fall.

This research, a collaborative effort with the Clemson Nursing Department, will investigate the workflow processes associated with medication administration in surgical units. This research is an important step in reducing nurse workflow complexity and developing safeguards to eliminate medication errors.

Classification System (HFACS) developed by Dr. Scott Shappell and Dr. Doug Wiegmann. This System examines the causes of human error on four different levels: unsafe acts, preconditions for unsafe acts, unsafe supervision, and organizational factors.

Faculty and Student Recognition

Clemson IE earned extensive recognition at the recent IIE 2008 Annual Conference in Vancouver. IE faculty (Dr. Maria Mayorga, Dr. Del Kimbler, and Dr. Mary Beth Kurz) and an IE graduate student (Mark McElreath) were recipients of IIE Best Paper Awards in the following tracks: Production Planning and Scheduling, Operations Research and Engineering Education.

In addition, Dr. Anand Gramopadhye was recently recognized by the College of Engineering and Science with the Collaboration Award for his work in virtual reality with Dr. Andrew Duchowski from the Department of Computer Science.

ViSIns: Virtual Reality To Support NextGen Education

Clemson University and Greenville Technical College in partnership with North Carolina A&T University, Embry Riddle Aeronautical University, Tri-County Tech and industry participants are working to create a national community of scholars. This initiative intends to develop and implement a Virtual Simulated Inspection (ViSIns) Laboratory using high fidelity 3-D knowledge objects to train aircraft maintenance technicians and students. This national resource will emphasize curriculum development, the assessment of the approach and the workplace preparedness needed in the modern aircraft maintenance technology curriculum.

The ViSIns Lab will include a wide range of innovative learning technologies including a virtual aircraft cargobay to teach immersive airframe inspection and a virtual borescope to teach engine inspection as well as eddy current and ultraviolet simulators to provide training on technology-specific techniques.

This innovative approach is the first to include 3D



Actual (left) and modeled (right) turbine blades. Maintenance students use models in virtual reality to practice blade inspection.

knowledge objects in nondestructive inspection in an aircraft maintenance curriculum. Existing approaches have not been able to mimic accurately the complexity of aircraft maintenance, reporting limited transfer capabilities and student preparedness for the workplace. The successful completion of this effort will fill not only state and national needs for well-prepared students in the aircraft maintenance

Janine Anthony Bowen '89 Industrial Engineering Endowment

The Department of Industrial Engineering is proud to announce the Janine Anthony Bowen Award. This endowment, established by Janine Anthony Bowen along with family and friends, provides awards for both undergraduate and graduate students. Its purpose is to enhance campus diversity by supporting women and minorities as permissible by law.

The endowment promotes two levels of achievement: scholars and fellows. Undergraduate Scholars are recognized for their outstanding academic performance during their pursuit of a B.S. Degree in Industrial Engineering. Graduate Fellows are recognized for their outstanding performance during their pursuit of an M.S./Ph.D.

The awards will be presented at the annual IE Recognition Dinner held in conjunction with Honors and Awards Week each spring.

For giving opportunities, visit us at:

www.ces.clemson.edu/ie/awards/students/studentawards.htm



Greenville Tech Aviation Maintenance students Tiffany King (left) and Victor Para (right) use a Window VR, an interactive touch screen mounted on a boom for counterbalance, to navigate through a virtual aircraft cargobay.

industry but will also result in a better understanding of the use of 3D knowledge objects as a pedagogical tool. At Clemson, this effort is being undertaken by Drs. Anand K. Gramopadhye and Mary E. Kurz from the Department of Industrial Engineering and Dr. Andrew Duchowski from the department of Computer Science.

2008 Industrial Engineering Awards

Sophomore Academic Achievement

Jessica L. Shaffer

Junior Academic Achievement

Rahul Colin Karanth
Joshua Neal
Whitney R. Darby

Jim Chisman Outstanding Senior

Danielle Nicole Lanigan

Lindemeyer Leadership & Public Service Award

Valerie N. DeVera

Senior Academic Achievement

Anna Sparks

Outstanding Junior

William Charlton, III

Kimbler Undergraduate Research Award

James D. Banks
Jaclyn D. Brenes
Lindsey C. Daniels

IIE Award of Excellence

Timothy J. Kickham

Outstanding Graduate Research

Ramesh Arumugam

Teaching Assistant of the Year

Thashika D. Rupasinghe



IIE Regional Conference 2009 to be Hosted by Clemson's Industrial Engineering Department

IE Welcomes New Faculty *Dr. Paris Stringfellow*



Clemson University will host the next IIE Region 2 Conference on February 5-8, 2009. This conference brings together 200-250 students to enhance their education through plant tours, professional speakers, hands-on activities, and friendly competitions. A total of 9 schools will participate.

The 2009 conference intends to emphasize the role of IE in a sustainable environment. We will look at such issues as how we

can design and manage processes which will remain robust and resilient in an ever-changing environment and our responsibilities as IE's in promoting and ensuring the sustainability of companies. This theme will be explored during the event's activities and speakers.

We are looking forward to this conference and the opportunity to host our IE neighbors!

Individuals and companies may support the upcoming IIE conference through donations and sponsorships. To find out more about how you can help or to participate in this important event, contact Dr. Kevin Taaffe at the following e-mail address: taaffe@clemson.edu.

The Industrial Engineering Department adds a new faculty member to its ranks. In January Dr. Paris Stringfellow joined the department as an Assistant Research Professor. She completed her Ph.D. (2007) in Industrial Engineering at Clemson University.

Her interest in Human Factors Engineering has led her to explore research in virtual reality, the ergonomic impacts of large screen displays, and human error. She is an active member of a number of professional organizations including IIE, the ASSE, the International Ergonomics Association and HFES. Stringfellow hopes to add to the department by serving as a resource for new research.



Where Are They Now? *Highlighting Clemson IE Alumni Kristen DiPaolo*



Kristen DiPaolo graduated with her B.S. in Industrial Engineering in 2006. She currently works for ExxonMobil's Gas and Power Marketing Company as an Americas Gas Analyst. Working on the natural gas trading floor, her primary responsibilities are monitoring the supply demand fundamentals and helping to ensure that natural gas reaches the best markets. Kristen loves being a member of her local alumni chapter so that she can cheer on the Tigers at watching parties when she can't make it to Clemson to be there in person.



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