

ISE news



NO. 12

DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

<http://ise.rutgers.edu>

CHAIRMAN'S MESSAGE

Dear Alumni, Colleagues, Fellow ISE's and Students,

I would like to welcome you to the Fall 2013 Newsletter of the ISE Department. The department, which continues its achievements and new developments, has consistently placed among the leading twenty-five universities offering ISE programs. Some of these achievements are highlighted in this newsletter.

On behalf of the ISE faculty, staff, students, and alumni, I would like to thank Professor Hoang Pham for his service, dedication, and leadership as a Chairman during the past six years.

The program has successfully gone through the ABET accreditation process and emphasis on energy systems is reflected in the new curriculum. A recently required course on sustainable energy and an elective course on energy systems modeling and optimization are now included in the ISE undergraduate curriculum.

The career placement of the graduating seniors and graduate students is excellent with 100% employment. This speaks well for the quality of the Department and the demand for ISE graduates. As in previous years, the faculty is engaged and active in introducing new courses that parallel the needs of society, conducting research, and providing service in



professional societies as officers and editors of leading professional journals. They have been recognized by many honors and awards, as well as their election as Fellows of their professional societies.

Your support, suggestions, or just simple observations are critical for making informed decisions about the continuous improvement of our department. Please feel free to send to us your opinions, ideas, or anything else you may want to share.

The continuous support of our alumni for the department is greatly appreciated by all.

I look forward to seeing and hearing from you.

E. A. Elsayed
Interim Chairman

Engineers Present Designs for Real World Use at Science Fair

Students in “Design 2” Class Create Machines for Applications Outside of Classroom



Lianne Ng/ Staff Photographer

Joseph Sikorski, a School of Engineering senior, explains how his group’s chocolate-making machine works. The machine allows users to customize their order and keeps them updated on its status through text message and email alerts. Users can also track the progress of their order online. The machine was made for “Design 2,” a class that allows senior engineering students to put their knowledge to practical use.

By Shawn Smith, The Daily Targum,
December 10, 2012

Imagine a machine that makes custom chocolates or a machine that simulates the movements of a fully functional elbow. These are just two of the projects that senior industrial engineering students at the University created and presented Friday at the 13th annual “Design of Engineering Systems” fair in the Busch Campus Center Cove.

Kwabena Agyemang, an Industrial and Systems Engineering senior, said her group’s project, created as an assignment for her “Design 2” class, is a culmination of four years of learning, applied to a real-world scenario. “This (‘Design 2’ class) was a challenge, it was a struggle mentally and wore you down,” she said. “But it was worth it in

the end. If we could get through this, we could get through anything in life.” Agyemang and his group members created a fully automated chocolate-making machine. Clients can go on a website, place an order, and specify what shape and filling they would like. The machine then creates the order and sends out a text message or email to the client to alert them their order is ready for pickup.

Thomas Barlow, also an Industrial and Systems Engineering senior, worked with a group that developed a device that simulates the natural movement of an elbow. This machine could help doctors diagnose elbow injuries and understand muscle forces. Sensors are attached to a mechanical arm, and as it moves, the machine analyzes data according to its movements. “We will provide a list of injuries with the machine to help with the diagnosis,” he said.

Within “Design 2,” students apply their accumulated skills to create their machine, said Joseph Sikorski, an Industrial and Systems Engineering senior. “The class, ‘Design 2,’ is a big part of the engineering program,” he said. “It is everything we have learned in all four years, applied here.” Barlow said the class not only taught the students how to practically apply four years of work, but also how to present and answer questions from people who know nothing about their projects. “We gave presentations once a week in class with the professors helping us prepare. We all saw significant improvements as time went on,” he said. “We answered basically the same questions every week from classmates, so it was interesting to get questions from people who were not involved with the process.”

Kang Li, an assistant professor in Industrial and Systems Engineering, said the class was developed to give students the chance to experience a real-life problem with the ability to ask professors for help when necessary. “We wanted them to integrate and apply their knowledge to a problem,” he said. “Something from a textbook has no application. This allowed them to deal with groups and use the knowledge from their classes.”

Li said the class gives students the chance to work on projects that would take place outside of the classroom and teaches them skills that they can take with them to future jobs. However, the groups had limitations to work with while they designed and created their projects. “All of the groups were given a budget of \$600,” he said. “They also had to have three parts to their projects: a mechanical design, some type of software integration, and optimization. They had to include optimization because we want them to have actual experience.”

E.A. Elsayed, a professor in Industrial and Systems Engineering who also taught the class, said the projects were designed to allow students to experience the stresses and problems of their peers in the field. “We wanted to train the students and give them real-life experience,” he said, and “included everything from A to Z, from the economics of a project to working in teams while under budget constraints.” Elsayed said that while they are given limitations, sometimes problems arise and teams will work with professors to figure out solutions. “Sometimes groups will run over budget,” he said. “Sometimes they won’t know how to handle or work with a vendor, so we are here.”

Elsayed said one of the biggest challenges of this project from the

professor's aspect is coming up with projects for the students. Every year professors come up with new ideas so that there are never repeats. "Our biggest challenge is coming up with projects that can be completed within a

semester that have elements from real life," he said. "We are always seeking innovative ideas and the planning for next year will start (Friday) afternoon when I go back to my office."

Li said that while the course is tough, it is meant to prepare students for life after graduation.

Human and Healthcare Engineering Lab:

Bridging Engineering and Clinical Worlds

Professor Kang Li has been working on evidence-based musculoskeletal injury evaluation, treatment, and prevention with his collaborators in two medical schools of Rutgers University (Robert Wood Johnson Medical School and New Jersey Medical School). Evidence-based medicine is a widely accepted clinical decision making approach, which seeks to evaluate the strength of evidences of the risks and benefits of different treatment strategies so that the best available evidence gained from scientific research studies can be applied to clinical decision making smoothly. Although this approach has been used in many healthcare specialties, it is not well adopted in musculoskeletal injury treatment. Many current treatment guidelines lack explicit evidence-based recommendation for treating various musculoskeletal injuries

and disorders. One of the major obstacles is the difficulty of



accurate characterization of the consequences after injuries and treatments. Dr. Li is developing a NSF-supported major research instrument for near-real-time high accuracy musculoskeletal system analysis named SKELETALMI, which aims to enable timely and accurate measurement, analysis,

and characterization of in vivo combined joint movement with

sub-millimeter accuracy (Figure 1). Such a high accuracy could advance the understanding of musculoskeletal disorders and injuries by identifying the subtle but important injury/treatment induced changes.

Dr. Li's research has been supported by NSF, NIH, Charles and Johanna Busch Memorial Fund, Faculty Research Grant, and Research Council Grant programs. His research has been published in well-respected referred journals including IEEE Transactions on Biomedical Engineering, Annals of Biomedical Engineering, Human Factors, and Journal of Biomechanics.

Visit <http://ise.rutgers.edu/faculty/kang> for more information on Dr. Li's research.

DEPARTMENT NEWS

Dr. Thomas O. Boucher, Editor-In-Chief, the Engineering Economist.

Dr. Elsayed A. Elsayed, Editorial Advisory Board Member, Proceedings of the Pakistan Academy of Sciences, September 2012 - Present.

Dr. Elsayed A. Elsayed, Editor-In-Chief, Journal of Quality Technology and Quality Management, January 2013 - December 2015.

Dr. Mohsen Jafari, Member of The Key Laboratory of Intelligent Transportation System of Anhui Province; Sponsored by The Department of Science and Technology of Anhui Province, China, February 2013.

Dr. Mohsen Jafari, Organized One-Day Workshop on Sustainable Ports and Energy Security, March 1, 2013.

Dr. Myong K. Jeong, Chair of INFORMS Data Mining Section, October, 2012.

Dr. Myong K. Jeong, Editorial Board Member, International

Journal of Business Analytics, 2012 - Present.

Dr. Kang Li, Advisor, Aresty Undergraduate Research Center Fellows (Nolan Patel and Aarjav Patel), 2012 - 2013.

Dr. Jim T. Luxhoj, Advisor, Rutgers Integrative Graduate Education and Research Traineeship (IGERT) Research Team, 2012 - 2013.

Dr. Jim T. Luxhoj, Invited Panelist, "Emerging Research Trends In Homeland Security and Emergency Response," Industrial and Systems Engineering Research Conference, San Juan, Puerto Rico, May 18 -22, 2013.

Dr. Jim T. Luxhoj, Advisor to the Transportation Research Board's Graduate Researcher Award Program, National Academies.

Dr. Tugrul Özel, Editorial Board Member, International Journal of Machine Tools and Manufacture, Elsevier, January 2013 - Present.

Dr. Tugrul Özel, Editorial Board Member, Production Engineering, Springer, January 2013 - Present.

Dr. Tugrul Özel, Editorial Board Member, International Journal of Manufacturing Research, InterScience Publishers, January 2013 - Present.

Dr. Tugrul Özel, Member of the Scientific Committee of The 41st North American Manufacturing Research Conference, University of Wisconsin, Madison, Wisconsin, June 10-14, 2013.

Dr. Tugrul Özel, Member of the Scientific Committee of the 14th CIRP Conference on Modeling of Machining Operations, Turin, Italy, June 13-14, 2013.

Dr. Hoang Pham, Associate Editor, Journal of Information & Optimization Sciences, 2013 - Present.

Dr. Honggang Wang, Research Advisor (With S. Albin), M. S. Hsu with Aresty Scholarship, A Senior Student Working on Simulation and Optimization for Oil/Gas Field Development.

Dr. Honggang Wang, Won The Henry Rutgers Scholars Award, 2013.

Keynote and Plenary Addresses at International Conferences

Dr. Elsayed A. Elsayed, Keynote Speaker, "Quality and Reliability Engineering in Global Competition," First International Conference on Quality Engineering, Tehran, Iran, December 3-4, 2012.

Dr. Elsayed A. Elsayed, Keynote Speaker, "Design for Reliability And Maintainability," 4th International Conference on Integrity, Reliability & Failure,

Funchal, Portugal, June 23-27, 2013.

Dr. Mohsen Jafari, "Advances In Safety And Mobility," ITS And Traffic Safety - China; Organized By Anhui Keli, Inc. And Province Of Anhui; Hefei, April 2013.

Dr. Hoang Pham, Plenary Speaker, "System Reliability Computing -- Modeling And Predictions," International

Conference On Optimization Modeling And Applications, Delhi, India, November 29 - December 1, 2012.

Dr. Hoang Pham, Keynote Speaker, "Systemability Computing And Its Applications," The 5th Asian Conference On Intelligent Information And Database Systems, ACIIDS2013, Kuala Lumpur, Malaysia, March 18 -20, 2013.

Graduating Industrial Engineers - Class of 2013

Ph.D.

Zhe Duan
Farnaz Farzan
Durul Ulutan

Sneha Patil
Aditya Girish Prabhu
Mark Rodgers
Merve Sehiralti Saglam
Dennis Sheehan
Brandon Theiss
Kaiming Wang
Xin Zhang

Nikita Dhillon
Michael Egan
Arda Erzin
August Grimm
Milad Haddad
Vu Ho
Lalaine Inumerables
Tarun Jada
Javier Jaramillo
Seung Yeop Jee
Sahir Jiwani
Josue Jolibois
Ronald Josias
David Kim
Elizabeth Kim
Ruth Lafrance
Peter Lebron

Neel Mainthia
Tomasz Madon
Claudia Medina
Jeffrey Meltzer
James Neal
James Nguyen
Adrian Poltorak
Holly Powell
Lindsay Riso
Nicholas Ruggirello
Joseph Sikorski
Kenley Ran
Ailicec Urrego
Lauren Wagner
Joseph Wong
Nelson Yeung

M.S.

Nan Ao
Fraz Ashraf
Rocco Avena
Matthew G. Brown
Yao Chang
Xin Dai
Gurkaran Singh Deol
Daisy Fung
Sichong Huang
Robert Kosaka
Warren Lam

B.S.

Kwabena Agyemang
Thomas Barlow
Ramone Barnes
Romaine Barnes
Michael Cheng
Yun Jun Chung
Victor Cusato-Rosa



Dr. Susan Albin and Dr. Hoang Pham with Industrial Engineers, Class of 2013

FACULTY NEWS

RESEARCH

Dr. Thomas O. Boucher, "Apparatus for Gap Management," National Academy of Science – Transportation Research Board, \$90,000, August 2013 - February 2015.

Dr. David Coit, "ARDEC Risk and Reliability Models for Condition-Based Ammunition Management," U.S. Army ARDEC, \$110,000/Year 1 Funding, April 2013 - April 2014.

Dr. David Coit, "Development of Reliability Models to Support the Recovery Gear Service Life Analysis Program - Phase 4," U.S. Navy/NAVAIR, \$66,000, June 2013 - September 2013.

Dr. Elsayed A. Elsayed, "Integration of Statistical Process Control and Automatic Process Control for Multistage Processes," National Priorities Research Program (NPRP), Qatar, \$ 936,307 (M. K. Jeong, Lead PI, K. N. Al-Khalifa, Co-Lead PI of Qatar University), Rutgers' share \$314,219, July 2012 - June 2015.

Dr. Elsayed A. Elsayed, "Investigation of Innovative Geometric Patterns and Sheet Folding in Solar and Water Desalination," National Priorities Research Program (NPRP), Qatar, \$ 837,222 (M. Yunan, Lead PI, American University in Cairo, F. Musharavati, Co-Lead PI of Qatar University), Rutgers' share \$102,000, March 2013 - February 2016.

Dr. Mohsen Jafari, "Building Energy Asset Management," Joint Work with Siemens and Funded by DoD – ESTCP Program, \$305,000, May 2012 - September 2013.

Dr. Mohsen Jafari, "P4S-China – A Traffic Safety Decision Support System," Anhui Keli, Inc., \$300,000, December 2012 - September 2013.

Dr. Mohsen Jafari, "P4S - A Traffic Safety Decision Support System for New Jersey," New Jersey Dept. of Transportation, \$250,000.

Dr. Mohsen Jafari, "Criticality and Asset Hierarchy Analysis," NYC-MTA, \$20,000, May 2013 - August 2013.

Dr. Myong K. Jeong, "Integration of SPC and APC for Multistage Manufacturing Processes," (Co-PIs: E. Elsayed; K. N. Al-Khalifa at Qatar University), QNRF, \$891,000 (Rutgers: \$318,812), November 15, 2012 to October 31, 2015.

Dr. Myong K. Jeong, "Phase II: Developments of the Methodology for the Automatic Identification of Fail Patterns in Memory Fail Bit Maps," Samsung Electronics, Inc., \$99,203, December 2012 - January 2014.

Dr. Myong K. Jeong, "Collaborative Research: Process Monitoring and Control in Autocorrelated Multistage Manufacturing Processes," National Science Foundation, (Co-PI **Dr. Elsayed A. Elsayed**), \$290,000, September 2012 - August 2015.

Dr. Kang Li (Co-PI), "MRI: Development of a Near-Real-Time High-Accuracy Musculoskeletal System Measurement and Analysis Instrument

(SKELETALMI)," NSF, (PI D. Metaxas, Co-PI: K. Li and V. Pavlovic), \$ 1,111,040, 2012 to 2016.

Dr. Kang Li (Co-PI), "Image-based Biomechanical Analysis of Complex Elbow Dislocation," New Jersey Health Foundation, (PI V. Tan), \$ 25,000, 2013 - 2014.

Dr. Kang Li, "Development of an Energy-Efficient Dexterous Hand Prosthesis," NASA-New Jersey Space Grant Consortium (NJS GC), (Co-PI **Dr. Elsayed A. Elsayed**), \$600, 2013.

Dr. Kang Li, "Trans-humeral Prosthesis with Dexterous Hand," NIH NIBIB – Innovative Senior Design Program (ISD), (Co-PI B. Craelius), \$3000, 2013 - 2014.

FACULTY AWARDS

Dr. Elsayed A. Elsayed, Recipient of the 2013 *Outstanding IIE Publication Award* for "Reliability Engineering" 2nd Edition, Wiley 2013.

Dr. Jim Luxhoj, Recipient of the 2013 Office of Naval Research (ONR) Distinguished Summer Faculty Fellow for the Naval Air Warfare Center/Aircraft Systems in Patuxent River, Maryland and Lakehurst, NJ.

Dr. Jim Luxhoj, Recipient of the 2012 – 2013 Rutgers Engineering Governing Council's Excellence in Teaching Award.

STUDENT NEWS

STUDENT AWARDS

The Professor Tayfur Altiok Scholarship has been established in honor of his academic legacy and will be granted to students who aspire to follow his vision and goals in life. **Amir Ghafoori** was the first recipient of this scholarship.

The Outstanding Senior, Junior, and Sophomore Awards are given to students who have demonstrated exceptional performance in senior, junior, and sophomore years, respectively. This year the department is proud to present the Outstanding Senior Award to **Tarun V. Jada**, the Outstanding Junior Award to **Anthony Mele**, and the Outstanding Sophomore Award to **Gwendolyn Campbell**.

The Robert & Carole Michna Award is given to a full-time undergraduate student with the initial award being made to a rising sophomore. **Ryan Bhattacharyya** was the recipient this year.

The Alfred A. Kuebler Award was established in memory of Prof. Kuebler, who provided the inspirational force for the establishment of Industrial Engineering at Rutgers. The annual award, provided by a fund that was established by Mrs. Eleanor Kuebler, is awarded to a student with both high academic achievement and involvement in asports activity. This years' recipient is **Gwendolyn Campbell**.

ISE Seniors Win Excellence Awards from Material Handling Society of New Jersey - The Material Handling Society of New Jersey (MHSNJ) Award of

Excellence is presented to a group project that has used theoretical knowledge in the design and construction of a successful working model. This year's award is presented to **Yuri Konratev, Jonathan T. Murray, Bill Ngo, Michael A. Obsuth, Michael H. Ostman, Evan R. Vinjamuri, and Jacob R. Ziegler**.

The Manzetti Scholarship is given to undergraduate students majoring in Industrial Engineering. Based on availability of funds, scholarship awards may be renewed for up to four years, provided that the student maintains eligibility. **David Ribeiro** was the recipient this year.

The IIE Outstanding Early Career IE in Business/Industry Award - Recognizes individuals in business/industry who have made significant engineering contributions in the application, design, research or development of IE methods. The award recognizes individuals who have shown outstanding characteristics in leadership, professionalism and potential in the field. **Brandon Theiss** earned this award.

The IIE Outstanding Teaching Assistant Award is given to a graduate student who is a teaching assistant and has voted the best teaching assistant by the ISE undergraduate students. **Nasim Arbabzadeh** was the recipient of this award multiple times and again this year.

Alpha Pi Mu National Award of Excellence The criteria for the scholarship awards includes: scholarship, leadership, sociability, ethicality, and

widespread interests. The 2012-2013 award was presented to **Tarun Jada**.

The Seventh IIE Lean Student Paper Competition was won by **Kshitij Minhas, Eric Fung, Minh Nguyen, Brenda Souza, and Shivang Shah**. They won **3rd place** for their paper entitled "Lean Six-Sigma Study of Rutgers Mail Distribution".

The Regional IIE Technical Paper Competition was won by **Holly Powell** and **August Grimm**. They placed **1st** in the Pittsburg, PA competition.

The IIE Engineers Gold Award - Rutgers IIE Chapter #841 was the recipient of a 2013 Chapter Recognition Gold Award. The award was earned under the leadership of **Corey Thistle**, as student president. This is the eighth consecutive year that the Rutgers Chapter has earned the IIE Gold Award.

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This newsletter is published for alumni, faculty, staff, and friends, by the Department of Industrial and Systems Engineering of Rutgers, The State University of New Jersey, Piscataway, NJ 08854
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