This issue of the newsletter focuses on some of the activities – past and present – in the Department of Industrial and Operations Engineering that aim to address growing concerns about health care. Life expectancy at birth increased from 47 to 78 years in the 20th century. Life expectancy at age 65 improved primarily after mid-century. Improved access to health care, advances in medicine, healthier lifestyles, and better health before age 65 are factors underlying decreased death rates among older Americans. [1]. What could be a better example of adding value than increasing the quantity and quality of life? Most of us can now look forward to many years of life free of debilitating diseases in our later years. Many of us will go on to a second career. Demand has helped to make health care a dominant force in our economy. According to the Washington Post, the health-care economy has produced 4.5 million new jobs, including related fields such as drug development and health insurance over the last 15 years. [2] The health care industry continued to add thousands of jobs in May 2008 while overall unemployment rates increased. Healthcare has created many opportunities for innovators of medical technology and for investors. Many successful companies have been founded to produce new medical devices, pharmaceuticals, medical monitoring equipment, and information systems.

While health care has much to offer, it does not come without a price. It poses a significant economic burden on individuals and employers. Because of the cost, many are unable or choose not to receive health care services. According to the US Census Bureau, in 2006 there were approximately 47 million people or 12.3% of the US population without health insurance. [3] The cost of health care and health insurance is expected to continue increasing. By 2082, health care is expected to account for nineteen percent of our GDP versus 4% in 2007. [2]

The dramatic growth of the healthcare system is significantly reflected here at the University of Michigan. The University of Michigan Medical School, founded in 1848, is one of the oldest programs at the university. Some alums will remember the old University Hospital at the North End of Observatory Street, which was built in 1925. [4] The health care system at the University of Michigan has grown steadily over the years with the addition of the Neuropsychiatric Institute adjacent to the main hospital in

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New IOE Faculty

Xiuli Chao, Professor; Ph.D.
Columbia University, 1989.

Xiuli Chao’s research interests include queueing, scheduling, financial engineering, inventory control, and supply chain management. He was on the faculty of the Department of Industrial and Systems Engineering at North Carolina State University, and from 2000 to 2003 he served as the co-director of the Interdisciplinary Operations Research Programs. He has also held regular or visiting positions at the Department of Industrial and Manufacturing Engineering at New Jersey Institute of Technology, the Graduate School of Management of the University of California at Irvine, the Department of Industrial Engineering and Operations Research at Columbia University, Department of Information Sciences at Tokyo University of Science, and Department of Industrial Engineering and Logistics Management of Hong Kong University of Science and Technology. Dr. Chao is the co-developer of the Lekin Scheduling System and is the co-author of two books. Chao received the 1998 Erlang Prize from the Applied Probability Society of INFORMS, the Outstanding Overseas Chinese Scientist Award from National Natural Science Foundation of China in 2002, and the Outstanding Overseas Scientist Award from Chinese Academy of Sciences in 2004. In 2005 he received the David F. Baker Distinguished Research Award from the Institute of Industrial Engineers.

Judy Jin, Associate Professor; Ph.D.
The University of Michigan, 1999

Professor Jin’s teaching and research interests are primarily in the areas of industrial statistics and quality engineering. Her recent research focuses on data fusion for complex system modeling, design innovation, and performance improvement decision making, which requires integration of system control theory, signal processing, data mining, applied statistics, DOE, quality and reliability engineering. Her research has been applied to various automotive and semiconductor manufacturing processes, transportation, and human decision support.
systems. She is an associate editor of *International Journal of Flexible Manufacturing Systems* and a board member of *IIE Transactions on Quality and Reliability Engineering*. She is a member of ASME, ASQC, IIE, INFORMS, and SME. She has received numerous awards including the Excellence at the Student Interface Award, Best Paper Awards, and a prestigious Presidential Early Career Award for Scientists and Engineers (PECASE).

Edwin Romeijn, Professor; Ph.D. Erasmus University Rotterdam, 1992.

Edwin Romeijn’s research area is optimization theory and applications, and he teaches courses in optimization and stochastic processes. His recent research activities mainly deal with systems arising in radiation therapy treatment planning and supply chain management. In radiation therapy treatment planning, the main goal is to develop new models and algorithms for efficiently determining effective treatment plans for cancer patients who are treated using radiation therapy, and treatment schedules for radiation therapy clinics. In supply chain optimization, his main interests are in the integrated optimization of production, inventory, and transportation processes, in particular in the presence of demand flexibility, limited resources, perishability, and uncertainty. Before joining The University of Michigan in 2008 he was on the faculty of the Department of Industrial and Systems Engineering at the University of Florida and the Rotterdam School of Management at the Erasmus University Rotterdam in The Netherlands. In addition, he has been a visiting faculty member at Columbia University, Maastricht University, National University of Singapore, University of California at Berkeley, University of Pittsburgh, and Massachusetts Institute of Technology. He serves on the editorial boards of *Optimization Letters*, *Journal of Global Optimization*, and the *International Journal of Inventory Research*. He has co-edited a special issue of *Operations Research in Health Care*, as well as a *Handbook of Optimization in Medicine*. He is the author of more than seventy peer reviewed publications.

Mark P. Van Oyen, Associate Professor; Ph.D. University of Michigan, Ann Arbor, 1992.

Professor Van Oyen’s research interests currently emphasize healthcare operations management and decision support systems. He also investigates the use of worker cross-training, flexible machines and other mechanisms to create agile operations that enhance supply chain performance. He is particularly interested in applied probability and the control of queueing networks and other discrete-event systems. Prior to joining the University of Michigan, Dr. Van Oyen has previously taught courses in probability, stochastic processes, simulation, Markov decision processes, operations management, supply chain management, and management of business process improvement. He is Associate Editor for *Operations Research* and for *Naval Research Logistics*. Dr. Van Oyen served on the research staff of GE Corporate R&D of Schenectady, New York as well in systems analysis and simulation for Lear Siegler Instrument Division.
Chair’s Message

Welcome to IOE News, our newsletter for alumni and friends of the Department of Industrial and Operations Engineering. This issue focuses on health care. As you will read in the feature article, many faculty and students in the IOE Department are researching topics of great interest to the health care field.

The IOE Alumni Society held their second annual meeting in October of 2007 during Engineering Alumni weekend and held their third meeting in October 2008. The Alumni Society is working to build an alumni network and increase communication between IOE alumni and current IOE students.

Students in IOE have had several chances to attend presentations by alumni this past year. Alumni Weekend featured speaker Mary Petrovich, the IOE Alumni Society Merit Award Winner for 2007. Mary spoke to the IOE community about her experiences and successes as CEO of AxleTech International. IOE alum, Kedrick Adkins, delivered the Wilbert Steffy Distinguished Lecture in March of 2008, “Leading Change in Health Care Transformation” and received the 2008 IOE Alumni Award.

IOE student groups have also been working on some exciting projects. The students in the University of Michigan Chapter of the Institute of Industrial Engineers are working to establish a scholarship for their fellow IOE students. The student chapter of the Human Factors and Ergonomics Society is planning a campus-wide interdisciplinary patient safety design contest. And the Alpha Pi Mu chapter will be hosting several company presentations, student/faculty mixers, and community service events for the current school year.

The University has completed a successful Capital Campaign and I wish to thank all of you for your contributions. As the late Randy Pausch, the Carnegie Mellon University professor well known for his video and book “The Last Lecture,” says of one of his mentors, “He gave me wise counsel. He changed my life. I could never adequately pay him back, so I just have to pay it forward.” In this newsletter are several opportunities to “pay it forward” including the Crawford Award, the IIE Student Scholarship Fund, and the usual IOE Funds listed on the form on page 19.

As you’ll see in this issue of IOE News, we’ve had a busy and productive year in the department. It is a pleasure to showcase the accomplishments of our faculty, staff, and alumni. Those accomplishments as well as the recognition garnered by our students, on all fronts, make me incredibly proud to be IOE Chair. I look forward to witnessing more achievements from the IOE community in the coming school year.

As always, this is your newsletter and we enjoy hearing from you. Please send your comments, suggestions, news items, etc. to seiford@umich.edu.

Go Blue!
Lawrence M. Seiford
Spotlight on IOE Student Societies

UM Chapter of IIE Aims to Endow Scholarship

The University of Michigan chapter of the Institute of Industrial Engineers has created a goal of endowing a scholarship for UM IOE Undergraduates. The endowment will be used to give back to the community, and encourage UM students to get involved with student societies. The UM-IIE Chapter has already raised $1,500 towards their endowment goal of $10,000. The UM-IIE Chapter, which hosts numerous social and corporate events throughout the year, is looking for help from alumni to reach the endowment goal. If you are interested in contributing to the IIE scholarship endowment, please see the form on page 19. An anonymous alum has agreed to match all contributions to the fund. The UM-IIE Chapter thanks you for your support!

HFES

The student chapter of the Human Factors and Ergonomics Society at UM, currently with 37 undergraduate and graduate student members, has organized or co-organized several events during the past year to help promote the field of HF/E and to increase awareness of HF/E issues around campus. One of our most popular events, the second-annual Bad Designs On Campus contest, was hosted last October to celebrate National Ergonomics Month. For this contest, anyone affiliated with the University could submit a description (and propose design solutions) for anything they interacted with on campus which they thought was a poor design, according to HF/E principles. The contest winners and other selected submissions can be viewed at http://www.engin.umich.edu/soc/hfes/bdoc/. Initial plans are in the works to address some of the problems described in the winning submissions.

In conjunction with a local chapter of the Michigan Usability Professionals Association (MI-UPA) and the Ann Arbor office for the VA hospitals National Center for Patient Safety (NCPS), AFES has co-organized several joint events, including a tour of the UM Transportation Research Institute (UMTRI), a presentation at the NCPS facility on HF/E issues in healthcare and a tour of their “museum of horrors” – a collection of instruments and procedures used in healthcare facilities which exhibited poor application of HF/E principles, and a number of conferences and presentations highlighting usability issues. In conjunction with UM Medical School’s Patient Safety Interest Group, plans are being developed for a campus-wide interdisciplinary patient safety design contest, which will be launched next Fall.

Alpha Pi Mu

APM has nearly sixty active student members and plans to double their number of initiates from 15 to 30 in this coming year. They will continue to host events such as company presentations, student/faculty mixers, and community service events. Many events are planned to assist the entire IOE undergraduate student body; such as the IOE Senior Advice Night, Internship/Interview Workshops and IOE tutoring program. The goal for 2008 is to work on building a stronger APM community through more focused social events and mixers. APM members work to emphasize the camaraderie and networking abilities that can be gained through participation in APM.
1939, the University of Michigan Women’s Hospital in 1950, the Child and Adolescent Psychiatric Hospital 1955, the C. S. Mott Children’s Hospital in 1969, the Holden Neonatal Intensive Care Unit in 1972, the W.K. Kellogg Eye Center in 1976, the University of Michigan Comprehensive Cancer Center in 1997, the Geriatric Center in 2006, the Depression Center in 2006, Cardiovascular Center in 2007 – among other specialty centers in various parts of Ann Arbor. In 2007 The University of Michigan Hospital and Health Centers managed 913 licensed beds, 848 medical surgical beds and 65 psychiatry beds; 18,298 full-time staff and 1,050 house officers or residents. There were 76,273 emergency service/urgent care visits, 64,669 surgical cases, 1,609,974 outpatient visits, and 42,901 discharges. Equipment and procedures used are constantly changing to take advantage of the latest technologies. The Board of Regents recently approved the schematic design for a new C.S. Mott Children’s and Women’s hospital with a budget of over $700 million. In addition, the University has purchased the 174 acre Ann Arbor property of pharmaceutical firm Pfizer located on the northeast corner of North Campus. The university will use the space to expand research activities in health, biomedical sciences, and other disciplines. Most IEs will immediately appreciate the problems and opportunities in the operation of a system of this size.

The Department of Industrial and Operation Engineering has a long and distinguished history of research and teaching related to healthcare. In 1963 Professors Clyde Johnson and Richard Berkley worked out a cooperative arrangement with the University of Michigan Hospital where the students, under faculty supervision, could work on projects of mutual interest. Both Professors Johnson and Berkley had extensive industrial experience in management before coming to the University of Michigan. Ultimately Professor Berkley transferred to the University Hospital to devote his all of his attention to IE healthcare. The Industrial Engineering program at the hospital grew to a full time Staff of thirty-two to do projects in the hospital and also provide professional services to hospitals throughout Michigan. Typical projects were ways to operate the laundry more efficiently, to serve meals while still hot, and to operate the elevators to minimize waiting time. The hospital laundry and cafeteria continue to provide projects for IOE 463 measurement and design work.


Richard Coffey (one of Professor Hancock’s PhD students) became Director of the Program and Operations Analysis Department at the University of Michigan Hospitals and Health Centers. In his paper “An introduction to critical paths”, Dr. Coffey shows that identification and use of critical paths can reduce variation in the care provided, facilitate expected outcomes, reduce delays, reduce length of stay, and improve cost-effectiveness. These methods are important tools for lean programs in health care. Dr. Coffey has taught IOE 481 “Special Projects in Hospital Systems,” for over twenty five years and will be handing off this course to Professor Mark Van Oyen in the 2008-9 academic year. In this very popular course, students identify and solve problems in a hospital setting using work measurement, process analysis and simulation tools.

Professor Van Oyen participated in a 2007 college task force to propose a new strategic thrust for the College of Engineering. He advocated that CoE target engineering-led innovation in health and wellness technologies, an area he termed “Health Engineering.” This new strategic initiative has since been adopted by the college. Professor Van Oyen is leading the development of Healthcare Systems Engineering as one area within Health Engineering. He held an operationally-focused health-
care seminar series that helped connect interested people from the hospital, Ross School of Business, School of Public Health, School of Nursing, and other fields of engineering. The modeling of hospital interactions as a complex, controllable queueing network is one way to describe the hospital in a useful way that builds on some of the foundations laid by Professor Hancock in addressing the hospital as a highly interdependent system. For example, Professor Van Oyen is working with Ph.D. student Jonathan Helm (recipient of an NSF Fellowship to pursue this research) on developing the methods to model, analyze and control the process flows in a hospital with focus on admissions, operating room scheduling, bed assignment, and the discharge process. He is working with Ph.D. student Hoda Parvin on dynamic resource allocation problems that specifically model the fact that different patients or tasks have service level needs (e.g., a deadline on when service must be rendered based on the severity or priority of the task). His work with Ph.D. student Soroush Saghafian addresses the strategic decision on the number of suppliers as well as the tactics of dynamic ordering policies to mitigate supply disruption risks such as those we have recently encountered in the US supply of influenza vaccine. He is working with postdoctoral researcher Shervin AhmadBeygi on addressing some of the operational needs of the Ann Arbor VA Hospital as well as the U of M Hospital.

One of the problems in large healthcare operations is scheduling staff. Healthcare is fundamentally a “pull” system that provides services based on patient needs but patients are often unpredictable. As a result staff are often on call and come in as needed. Maintaining legal staffing requirements, making available persons with the necessary skills, providing optimal training experience to medical students and residents, and achieving a fair and balanced workload can be a problem. Professor Amy Cohn who specializes in developing new models and algorithms for applied optimization problems saw this as a research opportunity. Teaming with PhD student Sarah Root and three residents from Boston University School of Medicine they developed a mathematical programming based approach that enabled chief residents to achieve the best balance between the needs of the patients, physicians and hospitals. This work appears in the Journal Interfaces.

Professor Jeffrey Liker, an expert on the Toyota production system and lean manufacturing, is working with Ph.D. student Brock Husby on applying lean methods in healthcare to develop case studies for a dissertation defining lean healthcare and documenting how the methods of lean need to be adapted to the health care context. Professor Liker is also working with Dr. Nadine Sarter, an expert on errors from a human factors perspective, and Ph.D. student Sarah Ballard on how lean methods can reduce rates of errors in healthcare.

Unfortunately, one of the factors that contributes to high healthcare costs is fraud related to healthcare provider billing and patient claims. In her recent paper “A Survey on Statistical Methods for Health Care Fraud Detection”, Profes-

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Focus continued from Page # 7

Some IOE faculty focus on the effectiveness of medical procedures. Professors Marina Epelman, Steven Pollock, and Edwin Romeijn have teamed up with medical physicists and radiation oncologists to study how radiation therapy can be administered to maximize treatment of cancerous tissue while minimizing damage to nearby healthy organs and tissues. In particular, Professors Epelman and Pollock and Ph.D. student Mustafa Sir recently published the paper “Ideal spatial radiotherapy dose distributions subject to positional uncertainties.” They describe the use of weighted power loss functions to measure performance of a treatment plan and proposed a method to calculate the ideal spatial dose distribution that minimizes expected loss. This work shows that the common practice of raising the power parameters in the treatment loss function in order to enforce target dose requirements is potentially counter-productive. Their results can be used to produce dose distributions that are robust against uncertainties.

Professor Romeijn has, in a collaboration with industrial engineering professor Ravindra Ahuja (University of Florida), medical physicist Dr. James Dempsey (ViewRay, Inc.), and Ph.D. students Arvind Kumar, Chunhua Men, and Caner Taşkin (University of Florida) developed new optimization models representing the technological aspects of radiation therapy delivery equipment. These models allow for the development of improved treatment plans by more accurately assessing the dose delivered to the patient [6, 7].

Richard Hughes (PhD IOE 1991), a professor in the Department of Orthopaedic Surgery and the Department of Industrial and Operations Engineering, has found many opportunities to apply his education in ergonomics and operations research. These include: the use of an integer programming model to determine the best exercise therapy regime for shoulder injuries and to determine the placement of bone screws for repairing broken bones. He has teamed up with an epidemiologist and an economist to develop a software tool for computing the statistical distribution of the net present value of cost and cost-savings resulting from an ergonomic intervention to prevent low back pain. Another application is the use of stochastic models to investigate the contribution of varying workload patterns to musculoskeletal injuries. This semester Professor Hughes has introduced a new course titled, “Optimization modeling in medical diagnosis and treatment.” The course will focus on formulating medical diagnosis and treatment problems as mathematical programming models.

Faculty in the Center for Ergonomics are concerned with how to improve health care delivery through design of work equipment and procedures. They are also concerned with preventing health problems that result from accidents and repetitive work that burden the health system. Emeritus Professor Don Chaffin worked on the development of biomechanical models for studying and controlling work-related back pain from 1967 to the present. He is best known for the University of Michigan Three-Dimensional Static Strength Prediction Program that is widely used for evaluating and designing jobs. He is also known for his textbook “Occupational Biomechanics.”

Professor Thomas Armstrong studies handwork. Although use of automation and outsourcing of manufacturing continue to increase, handwork continues to be an important part of our economy. He has conducted numerous studies that have resulted in important insights on the biomechanical causes of carpal tunnel and other hand/arm disorders and on the analysis and design of work equipment. One of his current projects is collaborating with investigators from Mechanical Engineering and the Medical School to develop methods for measuring and training of surgical methods.

Professor Monroe Keyserling is the director of a National Institute for Occupational Safety and Health training grant that provides support for MS and PhD training in occupational safety. Professor Keyserling also conducts safety research. Presently he is collaborating with investigators from the Medical School on a study of musculoskeletal disorders associated with standing work.

One of the consequences of medical technology is that practitioners are presented with many channels of data that could signal the need for an immediate intervention to save a life. Professor Nadine Sarter is working with PhD student Tom Ferris to investigate the use of tactile displays that are worn on the body to provide warnings when visual and auditory channels are preoccupied. This work is part of Professor Sarter’s multimodal display research initiative.

Congenital defects continue to place heavy demands on the healthcare system. Professor Bernard Martin collaborates with investigators from the School
2007 IOE Alumni Award

The IOE Alumni Society Merit Award Winner for 2007 was Mary Petrovich (BSE IOE ’85). Ms. Petrovich earned recognition as the U-M Outstanding Female Scholar/Varsity Athlete of 1985 before leaving campus to earn a Master’s in Business Administration from Harvard. Since then, she’s assumed a variety of functions and leadership roles at General Motors, Chrysler, AlliedSignal, Dura Automotive and, now, AxleTech International, where she serves as CEO and is responsible for the business performance of AxleTech, with $500 million in annual sales and 1,000 employees. In its first three years of operation, AxleTech has doubled its revenue and increased its profitability ten-fold.

Ms. Petrovich is a well-recognized industry leader. She was honored as a 2003 Michigan finalist for the global Ernst & Young Entrepreneur of the Year Award, named to Crain’s Automotive News Top 100 Women in the Automotive Industry in 2000 and has been featured in professional books and videos. The Award was presented at the 2007 Alumni Awards Dinner. Mary delivered the traditional noon (lunch) seminar to faculty, students and alumni on Friday, October 12, 2007. Mary currently serves on the Engineering Advisory Council of the University of Michigan College of Engineering.

2008 Steffy Lecturer and IOE Alumni Award

Kedrick Adkins delivered the 2008 Wilbert Steffy Distinguished Lecture titled “Leading Change in Health Care Transformation” on March 13.

Seven years ago, Trinity Health embarked on an enterprise effort to transform health care delivery through process redesign and technology adoption. The wide span of change in clinical settings and business functions has created significant service delivery improvement opportunities based on data driven analysis. This journey is being accelerated by the practical application of critical industrial, manufacturing and computer information system concepts. This includes lean process design, network architecture optimization, economic & statistical analysis, ergonomics and data mining.

In his Steffy Lecture, Mr. Adkins described the journey that Trinity Health has undertaken, provided examples of how Trinity Health has applied these engineering concepts to strategic initiatives that have been undertaken, and identified problem areas within the U.S. health care system that could potentially be addressed by creative use of engineering skills.

Mr. Adkins was also selected as the IOE Alumni Society Merit Award winner for 2008. Following a distinguished and impressive 30-year tenure with Accenture, Kedrick D. Adkins, Jr. joined Trinity Health to become President of Integrated Services. His responsibilities encompass the complete span of finance, information services, supply chain management and insurance / risk management.

While at Accenture, Mr. Adkins was a Senior Partner most recently serving as U.S. Country Managing Director and Global Chief Diversity Officer for this consulting, technology services and outsourcing company. He is well known and highly respected within the health care community and was considered to be one of Accenture’s pioneers and experts in the insurance and managed care industries. His experience includes strategy development, technology planning, systems design, installation and process reengineering for hospitals and health systems, physician-based organizations, national and international managed care companies, indemnity health insurers, numerous Blue Cross/Blue Shield plans and government health agencies.

Kedrick earned his bachelor’s degree in industrial engineering and his MBA in accounting and finance from the University of Michigan. Early in his career, he became a licensed certified public accountant. He currently serves on the Engineering Advisory Council of the University of Michigan College of Engineering.
Student Awards and Honors

**IOE Student Awards**

- Accenture Scholarship
  - Andrew Danielsky
  - Xiao Li
  - Sean Little
  - Miranda Olds
- Wyeth Allen Scholarship
  - Josselyn Frankiewicz
  - Benjamin Killmer
  - Xiao Li
  - Rebecca Rosenbaum
  - Sarah Zarowny
- Goldberg Scholarship
  - David Hamilton
  - Brian Rumao
- Hancock Scholarship
  - Alejandro Riera
  - Justine Marvin
- Clyde Johnson Scholarship
  - Andrew Danielsky
  - Barbara Fordyce
  - Brian Rumao
  - Kevin Tse
- Myun Lee Scholarship
  - Megan Haubert
  - Monica Lichty
  - Jennifer Perchonok
  - Matthew Raubinger
  - Ashley Weston
- Rasch Scholarship
  - Andrew Danielsky
  - Alda Wardhana
- Alpha Pi Mu Outstanding GSI Award
  - Michael Lau
- Murty Optimization Prize
  - Archis Ghate

**CoE Recognizes IOE Students**

- Distinguished Academic Achievement Awards
  - Feifei Hu
  - Jing Li
- Distinguished Leadership Award
  - Steve Agacinski
  - Irina Dolinskaya
  - Barbara Fordyce
  - David Hamilton
- IOE Graduate Distinguished Achievement Award
  - Shervin Ahmadbeygi
  - Roger M. Jones Fellowship
  - Ryan Rindler
  - Roger M. Jones Poetry Prize
  - Andrew Becker

**NSF Fellowships Awarded**

- Jonathan Helm was awarded an NSF Graduate Fellowship in the area of Industrial Engineering in April 2008.
- Sarah Ballard and Megan DeFauw received NSF Graduate Research Fellowships in May 2007.

**Doctoral Dissertation Proposal Award**

- Pierre-Yves Brunet has won the 2007 Doctoral Dissertation Proposal Award in Supply Chain Optimization from the Supply Chain And Logistics Engineering (SCALE) Center at the University of Florida.

**Tauber Spotlight Competition 2007**

- EGL/IOE students, John Nanry and Michael Duboe, are members of the winning teams for the 2007 Tauber Institute for Global Operations Spotlight! competition.

**Best Student Paper Award from HFES**

- IOE students Tom Ferris, Shameem Hameed, Robert Penfold, Nikhil Rao, and faculty advisor, Nadine Sarter received an Alphonse Chapanis Best Student Paper award at the 2007 meeting of the Human Factors and Ergonomics Society in Baltimore, MD. This award is for exceptional research by one or more students.

**Andrew S. Crawford Entrepreneurship Award**

- Ibrahim Shamsi
- Elin Svensson
- Kyra Watts

**ASEE Outstanding Student Instructor**

- IOE PhD candidate Michael Lau received Honorable Mention in the ASEE Outstanding Professor & Student Instructor Awards Selection and was honored at an awards ceremony on Wednesday, April 16, 2008.

**IOE Outstanding GSI**

- Each year, IOE students vote for one GSI that, in their opinion, has been outstanding at serving the IOE community and students. The 2007 Outstanding GSI Award went to Shervin Ahmadbeygi and Michael Lau was the 2008 recipient.
The Industrial and Operations Engineering Alumni Society held their second and third annual meetings on October 12th, 2007 and October 3, 2008.

Nine IOE alumni attended the 2007 board meeting including officers Rob Holt (President and Treasurer), Brad Finkbeiner (Vice-president) and Matt Stich (Secretary). Five alumni attended the 2008 meeting.

The meetings took place during The College of Engineering’s Alumni Weekend so attendees also had a chance to go to a football game, attend a department lunch with a presentation by IOE Alumni Award winners and interact with IOE students, faculty, and staff.

The board worked to clarify the Alumni Society objectives and to plan initiatives and events for the next year. One of the main objectives of the board is to build a better contact network of alumni. Alumni can stay in touch with IOE and each other by registering or updating their information on the IOE alumni database (http://ioe.engin.umich.edu/alumni/alumlist.php). Alumni who have a Facebook account may also join the new IOE alumni Facebook group at http://www.facebook.com/group.php?gid=5417234495 (Note: this site is run by the IOE Alumni Society, not the IOE Department). Another goal is to name a contact person for each graduating class to help establish contact with the members of that class. If you are interested in helping, please e-mail Elizabeth Fisher at efg@umich.edu.

Board members also set a goal for increasing communication between alumni and current IOE students. Plans include providing alumni mentors and contacts for senior projects, increasing fundraising for fellowships and scholarships for IOE students, and appointing an Alumni/Student Liaison.

The Alumni Society will meet again during the 2009 Alumni Weekend. Keep an eye on the IOE and College of Engineering websites for more information about Alumni Weekend.
Faculty News

Goker Aydin selected for IOE Outstanding Professor of 2008 Award by Alpha Pi Mu and Holt Award for Excellence in Teaching

Every March, IOE students cast their vote for instructors who have made great impacts on their education and lives. Goker Aydin was the 2008 recipient. Professor Aydin was also selected for the 2008 Jon R. and Beverly S. Holt Award for Excellence in Teaching, awarded by the College of Engineering. Goker follows in a long tradition of teaching excellence in IOE.

Professor Don Chaffin selected to receive 2007 American Association of Engineering Societies National Engineering Award

Don Chaffin received the 2007 American Association of Engineering Societies (AAES) National Engineering Award. Don’s citation for the award reads “To Donald Chaffin for his truly inspirational leadership and devotion to the improvement of industrial operations, and biomedical engineering education and to the advancement of the engineering profession, as well as to the development of national policies for the protection of worker safety and health.”

Past recipients of this award include Neil Armstrong, Eric Bloch, Robert Noyce, Norman Augustine, and G. Wayne Clough.

Professor Don Chaffin selected for Arnold M. Small Award

Industrial and Operations Engineering Professor Emeritus Don Chaffin received the 2007 Arnold M. Small President’s Distinguished Service Award from the Human Factors and Ergonomics Society (HFES). This Distinguished Service Award is the highest honor that the Society accords and recognizes Professor Chaffin’s extraordinary contribution to the field of ergonomics. Professor Chaffin’s award was presented at the Opening Plenary Session of the HFES 51st Annual Meeting in October.

Jing Li and Jionghua (Judy) Jin receive best paper award at the IERC 2008 conference

Former IOE PhD graduate student Jing Li and Professor Jionghua (Judy) Jin received a best paper award at the IERC 2008 conference for their paper titled, ‘Optimal Sensor Allocation for System Abnormality Detection by Integrating Causal Models and Set-Covering Algorithms’.

Professor Monroe Keyserling selected to receive the CoE Service Excellence Award for 2007-2008

Professor Monroe Keyserling received the CoE Service Excellence Award for 2007-2008 at the Faculty Honors and Awards Dinner on Saturday, March 29, 2008.

Professor Yili Liu selected for the IOE Department Award for 2007-2008

Professor Yili Liu received the IOE Department Award for 2007-2008. The award is to recognize a high impact accomplishment in some meritorious area benefiting the Department and the College.

In Professor Liu’s case, he was selected in recognition of his outstanding performance across all three areas of research, teaching and service. He has achieved significant research results in Cognitive Modeling and Engineering Aesthetics; his teaching at both the undergraduate and graduate levels is exceptional; he has provided extraordinary service to the Department serving as the Undergraduate Program Advisor for the past nine years in addition to various other Department and College committee assignments.

Yili Liu selected for IOE Outstanding Professor of 2007 Award by Alpha Pi Mu

The Industrial Engineering Honor Society, Alpha Pi Mu, selected Professor Yili Liu as the IOE Outstanding Professor of the year for 2007. Each year the IOE student population to votes for the
professor that, in their opinion, has been outstanding at serving the IOE community and students.

Professor Katta Murty receives IOE Departmental Faculty Achievement Award

Professor Katta Murty received the IOE Department Award for 2006-2007. The award is to recognize a high impact accomplishment in some meritorious area benefiting the Department and the College.

In Professor Murty’s case, he was selected in recognition of his life long achievements and the impact made through his research, education and service, especially his well-adopted textbooks, his successful application of OR in Singapore and Hong Kong, and his recognition as a finalist for the INFORMS Edelman award.

Professor Vijayan N. Nair has been elected by the Board of Directors of American Society for Quality (ASQ) as a Fellow of the Society in recognition of his significant contributions to quality. The citation for his accomplishments in the quality field reads as follows: For significant research contributions to quality improvement; for editorial service to ASQ journals; and for leadership in promoting industrial statistics.

An ASQ Fellow is an individual who has an established record of contributions, both to the quality profession and to ASQ. “ASQ presents these individuals with Fellow status to recognize the commitment they have made to making quality a personal ethic, an organizational imperative, and a global priority,” said ASQ President Roberto Saco. They are leaders of the quality movement, and many may become the future leaders of ASQ.
Ergonomics, Safety & Health

The IOE Department’s Center for Ergonomics has an active outreach program in the area of ergonomics and occupational safety and health. A wide range of activities and projects are undertaken, including: continuing education programs for practicing health and safety professionals; ergonomic service to business and industry; answering online ergonomics and safety and health questions; software development and distribution for ergonomic workplace design and evaluation; and curriculum and research support to academic and governmental institutions. Activities are regularly conducted on a collaborative basis with other leading academic institutions, such as UCLA and UC Berkeley; with governmental organizations such as the National Institute for Occupational Safety and Health and Michigan OSHA and with regional and national professional associations.

In a typical year, 1000 practicing engineers and health and safety professionals from around the world register for our continuing education programs. Many, many companies are represented, including Ford, General Motors, Chrysler, Dow Chemical, Abbott Laboratories, PPG Industries, PepsiCo, Marathon Oil, Alcoa, Pfizer, DTE Energy, General Electric, Intel, Conoco Phillips, just to name a few. More than 3000 people have licensed the 3D Static Strength Prediction Program software, which has become one of the most common tools used by ergonomists in the United States and Canada over the last two decades. Outreach activities are managed by Center for Ergonomics staff on a fractional appointment basis. Support for this work is provided by user fees and by competitive grants secured by the Center from state and federal sources. More information about Center outreach can be found in the “Continuing Education/Outreach” and “Tools and Services” sections of the Center for Ergonomics website: www.centerforergonomics.org.

Lean Healthcare

Professor Yavuz Bozer’s work focuses on facilities planning, manufacturing, distribution, logistics, and material handling. Recently, working with Frank Krupansky, Director of Materiel Services at the U-M Hospitals, Professor Izak Duenyas from the Ross School of Business, and a major medical supplier (Owens-Minor), he developed a week-long program for industry that focuses on Lean inbound logistics systems for hospitals. Many opportunities exist to apply Lean principles in such systems where a large number and variety of medical supplies and drugs received from the supplier must be distributed on a daily and timely basis to a large number of points-of-use through the medical complex. Upcoming courses in Lean Manufacturing can be found at http://interpro.engin.umich.edu/proed.htm?id=5.

Toyota Production Systems

Professor Jeffrey Liker’s international best seller “The Toyota Way: 14 Management Principles from the World’s Greatest Manufacturer, McGraw-Hill, 2004” speaks to the underlying philosophy and principles that drive Toyota’s quality and efficiency-obsessed culture. It has sold over 400,000 copies in 25 languages. It introduces Liker’s 4P model: philosophy, processes, people, and problem solving. The companion (with David Meier) Toyota Way Fieldbook, Mcgraw Hill, 2005 details how companies can learn from the Toyota Way principles. His book with Jim Morgan, The Toyota Product Development System, Productivity Press, 2006, is the first that details the product development side of Toyota. He is doing a series of books focused on each of the 4Ps. The first book with David Meier is Toyota Talent: Developing exceptional people the Toyota Way (May, 2007). His more recent book with Michael Hoseus called Toyota Culture: The Heart and Soul of the Toyota Way (January, 2008) won a 2009 Shingo Prize. Professor Liker has won a total of eight Shingo Prizes for Research Excellence. Professor Liker is currently working with Gary Convis, former Executive Vice President of Toyota, on a book titled Developing Toyota Leadership about how to develop leaders who

Professor Jeffrey Liker
live and teach the Toyota way. He has six PhD students working on various aspects of lean thinking in a variety of contexts including advanced R&D, healthcare, the prototyping process, and virtual teams. Professor Liker has given presentations and done consulting for Proton Industries in Malaysia, Chalmers Institute in Sweden, Tetrapak in Sweden, Fujitsu Technical Services of Europe, Bombardier Aerospace in Montreal, Vacon of Finland, Diamond Trading Company of London, the Fraunhofer Institute in Prague, Tamko Roofing, Hertz Rental Company, the Young President’s Organization, Solar Turbine, and Caterpillar.

**Airline Operations**

One of the consequences of highly lean operations is that their lack of slack reduces robustness, as they are less equipped to cope with disruptions. This is particularly true in the airline industry, where high fixed costs make it critical to utilize resources efficiently, but volatile and uncontrollable external circumstances (such as weather and air traffic congestion) make disruptions a common occurrence.

Professor Amy Cohn has been working closely with American Airlines, Southwest, LAN in Chile, Lufthansa in Germany, Federal Aviation Association, the Air Transport Association, and several unions of airline employees to find the right balance between efficient planning and robust operations. This research involves both making changes to the plans that are built in advance of operations, so that they better anticipate the possibility and impact of delays, as well as developing recovery mechanisms to quickly get “back on track” when disruptions do occur. In addition to her own collaborations with industry partners, she is working to strengthen the relationship between academia and the airline industry in general. The goal is to better educate academics about the real-world challenges that the airline industry faces while also educating airlines about cutting-edge research that they could use to improve their performance. For example, Professor Cohn has organized several sessions and panels that bring together key experts from both of these groups, both in the U.S. and abroad. In addition, she is working with the Alfred P. Sloan Foundation Industry Studies Program to provide academics with on-site opportunities to learn hands-on about the airline industry’s challenges, as well as bringing industry experts into the classroom to give students an in-depth exposure. As the newly-elected Chair of the Airline Applications Section of INFORMS, Professor Cohn will be overseeing several projects and programs next year; she will be organizing panels and sessions at conferences organized by the Airline Group of the International Federation of Operational Research Societies and the Canadian Operations Research Society meeting; and participating in the MIT Global Airline Industry Executive Education Program. She is also introducing a new graduate-level course entitled, “Airline Operations Research” which will use the airline industry as a means for studying complex transportation systems.

**Tauber Institute**

The Tauber Institute for Global Operations is a joint program of the College of Engineering and Ross School of Business. The Institute has been expanding its project portfolio, and in addition to a number of major project sponsors in manufacturing, the Institute is happy to report new project sponsors for the summer of 2008 in logistics (UPS), retail (Target), and health care (Seattle Children’s Hospital). Each year the Tauber Institute holds Spotlight!, a competitive presentation of operations and manufacturing solutions developed by student teams. Each team presents its project to an audience of corporate representatives, students, alumni and faculty. Judges from the manufacturing industry evaluate projects on scope, implementation, impact and overall presentation skills to determine the winners. IOE students, Joshua Johnson, Andrew Lesko, Robert Mersereau, Dan Nathan-Roberts and Punit Shah were members of the winning teams for 2008. First place went to the UPS team for “Landfill Gas Utilization as a Sustainable Energy Source,” second place went to the Cummins Inc., team presentation “North American B-series Engine Remanufacturing Operations Value Stream Assessment,” and third place was a tie between the BorgWarner Transmission Systems/Germany team with “Process Improvement for Global Product Launch” and the Intel team with “Effective Hub Networks and Maximized Customer Satisfaction: A Low-Cost Solution”.
Andrew S. Crawford
Entrepreneurship Award

A group of alumni recently established the Andrew S. Crawford Award for Entrepreneurship Excellence at the University of Michigan. This award is named after the late Professor Andy Crawford, in honor of his entrepreneurial spirit and interest in imparting business skills to Michigan engineers.

Professor Crawford spent 15 years teaching the entrepreneurship class in the Department of Industrial and Operations Engineering (IOE). The class he designed provided an overview of the skills needed to run a business — from goal-setting to accounting to marketing and sales. For many of you, writing your first business plan in Andy’s course was an early milestone. This class, which is still taught today, is an excellent example of how Andy was an incredible mentor to and motivator of Michigan undergraduates — a unique relationship at such a large university. In fact, Larry Page, co-founder of Google, was a student in the Entrepreneurship class.

Each semester, students in the Entrepreneurship course select an outstanding student leader in the class to receive the award named for Professor Crawford. The Crawford Award is intended to encourage engineers to pursue their entrepreneurial interests in a wide range of fields, just as many of you have done. Hopefully, the Crawford Award will empower future engineers who have the skills and interest to find the passion to also choose this path. The three most recent winners are pictured.

A donor has agreed to match all contributions. Mike O’Connell (IOE ’93) and Brad Finkbeiner (IOE ’99) have already written to many of you. If you are interested in supporting the Crawford Award, please contact the department (IOEAnnualGiving@umich.edu) or see the form on page 19.
of Human Movement Science to study spina bifida – a malformation of the spinal cord that often results in impaired use of the limbs. An investigation of the functioning of peripheral sensorimotor mechanisms will be used to design personalized interventions aimed at improving lower limb utilization.

We expect that the involvement faculty and students from Industrial and Operations Engineering will continue to find opportunities for health care research and training. We also expect that this research and training will continue to improve the efficiency of, and reduce the burden on, the healthcare system. At the same time this will further the advancement of IE tools that will benefit other industries and occupations in foreseen and unforeseen ways.

Works Cited:


Additional References:


Li, J., Huang, K., Jin, J. and Shi, J. “A Survey on Statistical Methods for Health Care Fraud Detection” to be published by Health Care Management Science.


Life in IOE

IOE graduate students and staff celebrate the newly remodeled graduate student offices - Chris Konrad, Eren Cetinkaya, Rod Capps, Chia-Wei Kuo, Blake Nicholson, Marshall Weir, Richard Chen, Ada Barlatt, Irina Dolinskaya, Esra Sisikoglu, Megan DeFauw, Joy Oguntebi

IOE faculty and students at fall orientation

IOE faculty and students at fall orientation
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Please see article on page 5

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