2006-2007 ANNUAL RESEARCH REPORT

INDUSTRIAL ENGINEERING

ARIZONA STATE UNIVERSITY
IE@ASU
Research at a Glance

Contents

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The IE Department enjoys an outstanding national and international reputation for excellence with particular strengths in industrial statistics and quality engineering, applied operations research, production and supply-chain logistics, and enterprise information systems in challenging manufacturing and service environments. A world-renowned faculty mentors approximately 170 graduate students—a ratio conducive to extensive faculty/student interaction—and has oversight of more than $2 million in research grants. The IE program is ranked in the top 20 nationally by U.S. News & World Report and is among the top programs in the western United States.

Our IE student body is exceptional. Students often receive national, regional and local recognition for their achievements in academics, research, teaching and leadership. ASU students have received the Pritsker Dissertation Award from the Institute of Industrial Engineers (IIE), and, recently a doctoral student’s dissertation proposal was selected for the Juran Fellowship, awarded for rigorous research on the topic of quality. Currently, more than 65 of our Ph.D. graduates hold faculty positions at institutions of higher learning around the world. These are testaments not only to our outstanding students, but also to the quality of education and mentorship provided by the dedicated faculty.

Degrees Awarded 2006-2007

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<th>Bachelors</th>
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Enrollment 2006-2007

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<th>Bachelors</th>
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<td>155</td>
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Many resources need to be networked to create a globally competitive North American aerospace manufacturing industry. Industry leaders need to make connections with current and potential suppliers. Governments need to know the mutual benefits and opportunities so they can support industry growth. Universities need to solve problems in supplier development and develop programs that train a workforce with the necessary leadership and technical skills.

To make a first step, the Department of Industrial Engineering at Arizona State University (ASU) established the basis for a long-term forum committed to the development of a binational aerospace industry. The first U.S.–Mexico Binational Aerospace Workshop for Supplier Development was held October 5th and 6th, 2006, in the city of Chihuahua, Mexico; it was organized in conjunction with co-sponsors Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) and the Secretariat of Industrial Development of the State of Chihuahua. The sponsoring universities arranged the two-day, special-invitation networking event for 130-plus attendees—governments, industrial developers, universities, and international and Mexican suppliers.

During the workshop, presenters discussed the logistics of aerospace industry development and breakout groups identified the current obstacles and strategic objectives for the binational aerospace industry. In addition, matchmaking sessions were arranged at the event to increase partnership. The workshop was successful and its primary objectives were fulfilled: 1) the basis was set for a long-term forum for continued discussion on a North American aerospace industry development, and 2) a steering committee was established to support the continued meetings between the suppliers, governments, and universities.

ASU and ITESM were already working to support the industry with highly-qualified engineers educated through a USAID-sponsored program on logistics. The customized graduate degree program for engineers was tailored to improve the global competitiveness of an integrated North American aerospace industry that would benefit the economy and welfare of North America. The program is training students through study in both Mexico and the United States and includes borderless internships that work on competitiveness improvement within an aerospace company sponsor.

Dr. Mary Anderson-Rowland has been honored for her dedication to promoting diversity in engineering and 2006 is proving no different. This year’s honors include election to the American Society of Engineering Education (ASEE) board of directors, election as a fellow of the Society of Women Engineers (SWE), and receipt of the ASEE Minorities in Engineering Award.
Anderson-Rowland is an associate professor in the Fulton School of Engineering Department of Industrial Engineering and director of three academic scholarship programs - NACME (National Action Council for Minorities in Engineering), CIRC (Collaborative Interdisciplinary Research Community), and CIRC/METS (Maricopa Engineering Transition Scholars). She has also been instrumental in creating several engineering diversity initiatives including the Women in Science and Engineering program and the Minority Engineering Program.

With election to the ASEE board of directors, Anderson-Rowland serves as chair of the Professional Interest Council IV, which promotes and facilitates engineering education activities in areas related to teaching, research, entrepreneurship, diversity, graduate studies and technology.

Anderson-Rowland was honored with the 2006 ASEE Minorities in Engineering Award in recognition of her success in increasing student diversity and motivating underrepresented students. She is also involved in research and activities to increase the recruitment, enrollment and retention of women in engineering education programs.

Faculty Keynote Addresses

Dr. Dan L. Shunk delivered the keynote address at two international conferences in 2006. The first, “Getting Your Home Operations in Order - To Compete and Win in the Global Marketplace,” was delivered at the Canadian Manufacturers and Exporters Annual Conference. The second, “The Roadmap to Achieve Distributed, Collaborative Commerce,” was at the International Conference on Concurrent Enterprising in Milan, Italy. Both addresses have been published.

Dr. Douglas C. Montgomery delivered the keynote address at the International Statistical Institute Meeting in January of 2006. The title of his published address is “Statistics and the Transformation of Science, Business and Industry.”

Institute Leadership

Dr. Ronald G. Askin was elected to serve as the Sr. Vice President for Continuing Education for the Institute of Industrial Engineers. In this position, Dr. Askin participates in setting strategic directions for IIE and on approving financial and operational plans. Dr. Askin is also serving as the Chair of the IIE Council of Fellows. Fellow is the highest membership rank of IIE.
2006-2007 Sponsored Research

Production Systems & Logistics
“DDDAS-Dynamically Integrated Production Planning & Operational Control for the Distributed Enterprise,” NSF, Ronald Askin
“Banner Throughput Collaborative: Operations Research,” Banner Health, Jeffery Cochran
“Banner Health/ASU Partnership for ED Patient Safety,” Banner Health, Jeffery Cochran
“ASAP Customization, Advanced Micro Devices,” John Fowler, Gerald Mackulak
“The SRC Fellowship,” SRC, John Fowler, Gerald Mackulak
“GOALI Collaborative Research: Matching Demand and Supply through Price and Lead Time Decisions,” NSF-ENG Civil, Mechanical and Manufacturing Innovation (CMII), Esma Gel
“Multi-Product Cycle Time & Throughput Evaluation,” SRC, Gerald Mackulak, John Fowler
“Efficient Model Generation of AMHS Design Alternatives,” Asyst Technologies, Gerald Mackulak, John Fowler
“Industrial Assessment Center Program,” US Dept of Energy, Rene Villalobos
“Automated Generation of AVI Routines for Surface Mounted Assembly Systems,” NSF, Rene Villalobos
“Logistics Capacity Study of the Guayamas-Tucson Corridor,” ADOT, Rene Villalobos
“US-Mexico Partnership on Education & Technology Transfer for the Aerospace Industry Assn Liaison Office for University Cooperation in Des,” Rene Villalobos, John Fowler, Esma Gel
“Arizona State University Affiliation with the Center for Engineering Logistics & Distribution,” NSF, Rene Villalobos, Ron Askin, Esma Gel

Information & Management Systems
“Distributed Decision Support Framework for Adaptive Supply Chains,” IBM, John Fowler, Teresa Wu
“Fabrication Environmentally Conscious (Benign) Manufacturing into Engineering Education,” UTEP, Teresa Wu
“Automatic Extraction & Coordination of Audit Data & Features for Intrusion & Damage Assessment,” DOD-Air Force, Nong Ye

Industrial Statistics
“Collaborative Research: Hierarchical Modeling of Yield & Defectivity to Improve Factory Operations,” SRC, Douglas Montgomery
“Statistical Modeling of Customer Satisfaction Data,” IBM, Douglas Montgomery
“Self-Learning of Decision Rules for Process Control,” NSF, George Runger
“Credit Risk Analytics,” Desert Schools Fed Credit Union, George Runger
“Data Mining Pilot on Intel Factory Data,” Intel, George Runger

Engineering Education & Undergraduate Research
“Collaborative Interdisciplinary Research Community (CIRC),” NSF, Mary Anderson-Rowland
“Collaborative Research: Maricopa Engineering Transition Scholars (METS),” NSF, Mary Anderson-Rowland
“Collaborative Interdisciplinary Research Community Maricopa Engineering Transition Scholars (CIRC/METS),” NSF, Mary Anderson-Rowland
“NACME Scholars Program,” NACME, Mary Anderson-Rowland
“Academic & Professional Development for Upper-Division Computer Science, Engineering and Mathematics Students,” NSF, Mary Anderson-Rowland
“Scholarships for Science, Technology, Engineering, and Mathematics (NSF S-STEM),” NSF, Mary Anderson-Rowland
“Using Mathematical Programming for Associative Classification,” Fulton Undergraduate Research Initiative, Reina Dharzani, Ahmet Keha
“A Divide-and-Merge Algorithm for Single Machine Weighted Number of Tardy Jobs,” Fulton Undergraduate Research Initiative, Gina Dumkrieger, Ahmet Keha
“Comparative Analysis of M/M/1 and M/G/1 Queuing Models in Healthcare,” Fulton Undergraduate Research Initiative, Garrett Bean, Jeffery Cochran
“Is There a Relationship Between a Negative Medical Incident and the Intervention, Implemented Over Time, to Limit It?,” Fulton Undergraduate Research Initiative, Jeff Kenyon, Jeffery Cochran

Operations Research
“Predicting and Prescribing Human Decision Making Under Uncertain and Complex Scenarios,” AFOSR, Ronald Askin
“Multi-Product Cycle Time & Throughput Evaluation via Simulation on Demand,” SRC, John Fowler, Teresa Wu
“EPNES: Integrated MEMS & Advanced Technologies for the Next Generation Power Distribution System,” NSF, Esma Gel
“Improving Airline Schedule Planning at Swift Aviation Group,” Swift Aviation Group, Ahmet Keha
“Pricing & Profit Optimization for Financial Services,” Response Analytics, Teresa Wu

Arizona State University Industrial Engineering
Dr. Montgomery is Regents’ Professor of Industrial Engineering and Statistics and the ASU Foundation Professor of Engineering at Arizona State University. He received the Ph.D. in engineering from Virginia Polytechnic Institute and State University.

His research interests focus on designed experiments for product/process design and development, empirical model-building, and process monitoring and control. Dr. Montgomery is an author of 11 books that have appeared in over 30 English editions and numerous foreign language editions and over 190 archival journal papers. He has mentored 50 Ph.D. students and over 40 M.S. students. He is a recipient of the Shewhart Medal, the Brumbaugh Award, the Lloyd S. Nelson Award, the William G. Hunter Award, and the Shevell Award (twice) from the American Society for Quality. He is also a recipient of the Ellis R. Ott Award. He is a former editor of the Journal of Quality Technology and is the currently one of the Chief Editors of Quality & Reliability Engineering International. He serves on the editorial boards of several other professional journals. Dr. Montgomery is a Fellow of the American Statistical Association, a Fellow of the American Society for Quality, a Fellow of the Royal Statistical Society, a Fellow of the Institute of Industrial Engineers, an Elected Member of the International Statistical Institute, and an Elected Academician of the International Academy for Quality.
Ronald Askin is a Professor and Department Chair of Industrial Engineering at Arizona State University. He has authored or co-authored over 80 professional publications, primarily on the application of operations research and statistical methods to the design and analysis of production systems. His current research concentrates on developing integrated models for operational planning including facilities design, production planning, scheduling, material flow, and quality assurance. Other research interests include project management, team formation, and human decision making.

Dr. Askin co-authored the texts *Modeling and Analysis of Manufacturing Systems* (1993) and *Design and Analysis of Lean Production Systems* (2002), both of which received the IIE Joint Publishers Book of the Year Award (1994 and 2003, respectively).

Dr. Askin is a Fellow of the Institute of Industrial Engineers (IIE), and an active member of the Institute for Operations Research and Management Science (INFORMS) and the Society of Manufacturing Engineers (SME). He currently serves as Chair of the Council of Fellows for IIE and on the IIE Board of Trustees.

Other awards he has received include the *IIE Transactions* on Design and Manufacturing Best Paper Award (twice as co-author), the Shingo Award for Excellence in Manufacturing Research, *IIE Transactions* Development and Applications Award (co-author), the ASEE/IIE Eugene L. Grant Award (co-author), and the National Science Foundation Presidential Young Investigator Award.

Recent Publications


Leadership Activities

Recent Publications


Leadership Activities

Area Editor—Manufacturing, SCS Transactions on Simulation; Area Editor—Planning & Scheduling, Computers and Industrial Engineering; Associate Editor, IEEE Transactions on Electronics Packaging Manufacturing; Associate Editor—Factory Modeling and Control, IEEE Transactions on Semiconductor Manufacturing; Editorial Board, IIE Transactions; Editorial Board, Journal of the Chinese Institute of Industrial Engineers; Editorial Board, Journal of Simulation; Guest Editor—eManufacturing in the Semiconductor Industry, IEEE Transactions on Automation Science and Engineering.

John Fowler

Professor
Ph.D., 1990, Texas A&M University
Deterministic scheduling, discrete event simulation methodology, semiconductor manufacturing systems analysis, healthcare systems analysis and applied operations research
Modeling And Analysis For Semiconductor Manufacturing Laboratory (MASM lab): ie.fulton.asu.edu/research/masm-lab

John W. Fowler is a professor in the operations research and production systems and logistics groups. Much of his research has focused on scheduling and simulation methodologies for application in semiconductor manufacturing. His research has been well supported by the National Science Foundation (NSF), the Semiconductor Research Corp., International SEMATECH, as well as by several leading semiconductor manufacturers. Over the last two years, he has begun research on applications of scheduling, simulation, and other operations research techniques to health care and was recently awarded a grant from the National Science Foundation to investigate ways to schedule surgical delivery systems.

Dr. Fowler has co-authored over 60 journal articles in outlets including Computers and Operations Research, Decision Sciences, European Journal of Operational Research, IEEE Transactions on Semiconductor Manufacturing, Journal of Scheduling, and Operations Research. In addition, he has co-authored 11 book chapters and nearly 100 conference papers. He has advised or co-advised 20 Ph.D. students, 22 Master’s students, and 3 undergraduate Honors’ students.

Dr. Fowler is a Fellow of the Institute of Industrial Engineers (IIE), is a member of the Board of Directors of the Winter Simulation Conference, is Treasurer of Omega Rho (the IE Honor Society), and serves on the INFORMS Subdivisions Council. He is co-Program Chair of the 2008 Industrial Engineering Research Conference and Program Chair for the 2008 Winter Simulation Conference.
Gary L. Hogg is currently a Professor of Industrial Engineering at Arizona State University. He holds an M.S. and Ph.D. from the University of Texas in Operations Research and B.S.M.E. from Texas A&M University.

His graduate training and subsequent research has been in the area of applying operations research, particularly simulation and optimization, to the design and control of production and service systems. He has taught a broad range of operations research and industrial engineering courses during his 35-plus year academic career, published widely, and conducted research for NSF, NASA, USAF, DOE, EPRI, DOT, DOD and the DOC. He has also served as a consultant to over twenty-five Fortune 500 corporations, but also, many smaller manufacturers. The bulk of his industrial experience is in high tech manufacturing, particularly aerospace and electronics.

He served as Program Head of IE, Interim Head of the IE Department and Associate Dean for Research and International Programs at Texas A&M. From 1995 through 2005 he served as the Chair of Industrial Engineering at Arizona State University. He is a Fellow of the Institute of Industrial Engineers and has served on the IIE Board of Trustees, Chair of the Council of Industrial Engineering Academic Department Heads, VP of Technical Societies, Director of the OR Division and President of the Arizona Chapter of IIE as well as the Brazos Valley Chapter (Texas).


Recent Publications


Leadership Activities
Associate Editor–Probabalistic Models, Computers & Industrial Engineering
Recent Publications


Leadership Activities

Department Editor, *Journal of Quality Technology*;
Associate Editor, *Journal of Mathematical and Management Sciences*.

George Runger

Professor
Ph.D., 1982, University of Minnesota
Statistical learning, process control, and data mining for massive, multivariate data sets with applications in numerous disciplines
Quality and Reliability Engineering Laboratory (Q&RE lab)

George C. Runger, Ph.D., is a Professor in the department of Industrial Engineering at Arizona State University. His research is on real-time monitoring and control, data mining, and other data-analysis methods with a focus on large, complex, multivariate data streams. His work is funded by grants from the National Science Foundation and corporations. In addition to academic work, he was a senior engineer at IBM. He holds degrees in industrial engineering and statistics.
Dr. Shunk came from industry to ASU in 1984 as an associate professor of industrial engineering. From 1984 to 1994, he served as the CIM Systems Research Center Director. He is currently serving as the AVNET Chair of Supply Network Integration.

His principal research interests are in material, information, knowledge supply network integration, computer integrated manufacturing, electronic commerce progression, time compression, cultural acceptance of change and enterprise integration.

Shunk is a senior member of the Institute of Industrial Engineers and a senior charter member of the Computer Aided Systems Association of the Society of Manufacturing Engineers. He is also a member of the Alpha Pi Mu and Tau Beta Pi honor societies. He currently serves on the editorial boards and the International Journal of Flexible Automation and Integrated Manufacturing, International Journal of Logistics, and the International Journal of Product Development.

**Dan Shunk**

**Professor, AVNET Chair**

Ph.D., 1976, Purdue University

Agile, enterprise and CIM systems, group technology, planning systems, economics of computer-integrated manufacturing (CIM), strategy and strategic role of technology

Supply Network Integration Laboratory (SNIL)

**Recent Publications**


**Leadership Activities**

Dr. Ye’s past and current research activities—garnering over $9M external funding and have producing seventy-six journal papers, two books including The Handbook of Data Mining, and one U.S. patent—fall into the following two areas: data and modeling, and optimization and quality control of system operations.

Her research in data and modeling involves applications in computer and network data, cognitive behavior data, and biomedical data. Research in optimization and quality control of system operations involves computer and network systems, and manufacturing and supply chain enterprises.

Ye’s interdisciplinary research is bringing industrial engineering theories and techniques into the scientific understanding and engineering of information systems. Applications of her research are establishing scientific understanding of information systems and the human brain, and developing engineering technologies for secure and dependable information systems.

Recent Publications


Leadership Activities

Associate Editor, IEEE Transactions on Reliability; Associate Editor, Information, Knowledge, Systems Management; Editor, IEEE Transactions on Systems, Man, and Cybernetics, Part A; Editorial Board, International Journal of Human-Computer Interaction; Editorial Board, Information, Knowledge, Systems Management.
Mary Anderson-Rowland is an associate professor in the Department of Industrial Engineering in the Ira A. Fulton School of Engineering at ASU. Anderson-Rowland received her B.A. in mathematics from Hope College in 1961, and her M.S. and Ph.D. in mathematics/statistics from the University of Iowa in 1963 and 1966, respectively.

Anderson-Rowland came to ASU in 1966 as a lecturer in mathematics and became the first woman faculty in engineering in 1974. She served as a statistical consultant to a variety of industry from 1973 until 1993, when she became the first woman appointed as an associate dean in the engineering school. She served as the associate dean of Student Affairs for 11 years. She is currently serving as the director of three academic scholarship programs and a fourth project for transfer students.

Anderson-Rowland was heavily involved in the creation of the Women in Engineering Program as well as the Minority Engineering Program. She serves as a mentor for women and underrepresented engineering students as well as supporting research that increases the recruitment, enrollment, and retention of engineering students with over 150 publications.

Anderson has been the recipient of six national awards and recognitions: American Society for Engineering Education, Fellow, 2001; Distinguished Engineering Educator Award, Society of Women Engineers, 2002; National Engineering Award, 2003, the highest award given by the American Association of Engineering Societies; SHPE National Educator of the Year Star Award, 2005; Minorities in Engineering National Award, American Society of Engineering Education, 2006; and Society of Women Engineers, Fellow, 2006.

Recent Publications


Leadership Activities

2007 WEPAN Proceedings Chair; 2006-2008 PIC IV Chair, Board of Directors, American Society of Engineering Education; 2005 Women in Engineering Division Chair, American Society of Engineering Education; Women in Engineering Recruitment and Retention Expert, National Academy of Engineering.
Esma S. Gel

Associate Professor
Ph.D., 1999, Northwestern University
Applied probability, stochastic processes, queuing theory, stochastic modeling and control of manufacturing systems

Esma Gel researches and teaches courses in the area of Operations Research, specifically focusing on production systems control and supply chain management.

Her research focuses on the use of applied probability techniques for management and design of production systems and supply chains. Some of her recent work has been on workforce agility and management, dynamic price and lead time quotation to manage congestion in make-to-order systems, queueing approximations for performance evaluation of manufacturing systems, and economic impact of inventory record inaccuracies in retail environments. Gel has presented her work in national and international conferences, and published in leading archival journals of her area. Her research has been funded by the National Science Foundation (NSF), as well as industrial partners such as Intel, IBM, and Infineon. Her latest grant from NSF involves the development of a framework for the integration of price, lead time, order selection, and inventory decisions to match supply with demand.

Gel is a member of the Institute for Operations Research and the Management Sciences (INFORMS), the Institute of Industrial Engineers, American Society of Engineering Education (ASEE), and the Operations Research Society of Turkey.

Recent Publications


Leadership Activities

Associate Editor, Journal of Flexible Services and Manufacturing
Gerald Mackulak
Associate Professor
Ph.D., 1979, Purdue University
Simulation methodology, simulation output analysis, automated production systems, material handling design and analysis

Recent Publications


Leadership Activities
Associate Editor, Transactions of the Society for Modeling and Simulation International; Editorial Board, International Journal of Simulation and Process Modeling; General Chair 2011, Winter Simulation Conference.

Gerald Mackulak is currently participating in sponsored research from the SRC/International Semitech. His collaborative research project is investigating multi-product cycle time and throughput evaluation via simulation on demand, sponsored by Force II/SRC.

In previous years, he has participated in sponsored research from the Semiconductor Research Corporation, Anteon Corporation, Asyst, NSF, PRI Automation, the Federal Highway Commission, the McDonnell Douglas Corporation, the Hughes Missile Systems Company, the Institute for Manufacturing and Automation Research, the Allied-Signal Corporation, and Motorola.

Mackulak has written more than 75 journal and conference papers. He was recently a member of the editorial board of International Journal of Simulation and Probability Modeling; a past associate editor for Simulation: Transactions of the Society for Modeling and Simulation International, and in 2003 edited a special issue of the journal. He has received several Engineering Teaching Excellence Award nominations. He currently serves as the General Chair for the Winter Simulation Conference in 2011.
J. René Villalobos
Associate Professor
Ph.D., 1991, Texas A&M University
logistics, automated quality systems, manufacturing systems and applied operations research
International Logistics and Productivity Improvement Laboratory (ILPIL): ilpil.asu.edu

René Villalobos came to ASU in 1999 from the Mechanical and Industrial Engineering Department at the University of Texas at El Paso where he had been serving as an associate professor. Prior to academia, Villalobos served as an industrial engineer for Packard Electric and a project engineer for Renault Company. Sponsors of Villalobos’ research include the National Science Foundation, Texas Advanced Technology Program, the Arizona Dept. of Transportation, U.S. Army and private industry totaling an excess of $3 million dollars. He was the recipient of the 1993 IIE Doctoral Dissertation Award and a 1995 NSF Career Grant.

He is a member of Alpha Pi Mu, the Institute for Operations Research and the Management Science, and the American Society for Engineering Education. He is also a member of the Technical Advisory Board for International Journal of Interactive Design and Manufacturing.

Recent Publications


Jing Li

Assistant Professor
Ph.D., 2007, University of Michigan
Applied statistics, process control, data mining, causal modeling and inference

Jing Li joined the Quality and Reliability Engineering Laboratory (Q&RE lab) at Arizona State University Industrial Engineering in Fall 2007. Her research interests include applied statistics, data mining, causal modeling and inference, for process control, and high-dimensional datasets in complex systems for improving interdependency of products and processes. Her work has been applied to manufacturing and public health problems.

She recently received an IIEC Best Paper award for “Causality-Based T2 Decomposition for Multivariate Process Monitoring and Diagnosis,” co-authored with Judy Jin and her advisor, Jan Shi, at the 2006 IIE Conference.

Jing Li is a member of the Institute for Operations Research and the Management Sciences (INFORMS) and the Institute of Industrial Engineers (IIE). She recently received an IERC Best Paper award for “Causation-Based Causal Modeling and Inference,” in which she and her colleagues demonstrated a new approach to causal inference in complex systems.


Ahmet Keha

Assistant Professor
Ph.D., 2003, Georgia Institute of Technology
Computational and theoretical aspects of integer programming and combinatorial optimization, modern heuristics techniques, logistics and scheduling
Logistics, Optimization and Control Laboratory (LOC Lab)

Ahmet B. Keha joined the Ira A. Fulton School of Engineering in 2003, after receiving his Ph.D. from the Georgia Institute of Technology. His research interests include computational and theoretical aspects of integer programming and combinatorial optimization, application of integer programming, and modern heuristic techniques and scheduling.

Keha has presented papers at the INFORMS National Meetings, International Symposium on Mathematical Programming and Industrial Engineering Research Conferences. Some of the journals that he has published are Operations Research, the European Journal of Operational Research, and Operations Research Letters.

Recent Publications


Jing Li joined the Quality and Reliability Engineering research group in Fall 2007. Li’s research interests include applied statistics, data mining, causal modeling and inference. Her recent research focuses on modeling and analyzing massive high-dimensional datasets in complex systems for improving the quality of products and processes. Her work has been applied to manufacturing and public health problems.

She recently received an IERC Best Paper award for “Causation-Based T2 Decomposition for Multivariate Process Monitoring and Diagnosis,” co-authored with Judy Jin and her advisor, Jan Shi, at the 2006 IIE Conference.

Li is a member of the Institute for Operations Research and the Management Sciences (INFORMS) and the Institute of Industrial Engineers (IIE).

Recent Publications


Rong Pan
Assistant Professor
Ph.D., 2002, Pennsylvania State University
Industrial statistics, reliability analysis and time series modeling
Quality and Reliability Engineering Laboratory (Q&RE lab)

Rong Pan joined the Department of Industrial Engineering in the Ira A. Fulton School of Engineering in 2006. He received his B.S. in Materials Engineering from Shanghai Jiao Tong University, China, in 1995; his M.S. in Industrial Engineering from the College of Engineering of Florida A&M University and the Florida State University in 1999; and his Ph.D. in Industrial Engineering from the Pennsylvania State University in 2002. Before coming to ASU, Pan was an assistant professor of Industrial Engineering at the University of Texas at El Paso.

Pan’s research interests include statistical quality control, reliability engineering, time series analysis and control, and supply chain management. Journals he has published in include Journal of Quality Technology, Journal of Applied Statistics, International Journal of Production Research, and Quality and Reliability Engineering International. His current research project, funded by the National Science Foundation (NSF), is on modeling and analysis of profiled reliability testing using computation-intensive statistical methods. His previous projects were funded by U.S. Department of Education (DoEd), Texas Department of Transportation (TxDOT) and GM.

Pan is a senior member of American Society of Quality (ASQ), and a member of the Institute for Operations Research and the Management Sciences (INFORMS), Institute of Industrial Engineering (IIE), and Institute of Supply Management (ISM). He is currently serving as an associate editor of Journal of Quality Technology.

Recent Publications


Leadership Activities

Associate Editor, Journal of Quality Technology
Dr. Zhang’s past and present research work has been on developing techniques for robust optimization, transportation, and distribution in logistics, mixed-integer programming, combinatorial optimization, and network flows. Her work has been studying the two-stage robust network flow and design problem with demand uncertainty.

In the first stage, integer capacity decisions and flows on a subset of the arcs are determined. The recourse flow is determined in the second stage, after the realization of the uncertain demands. The robust network flow and design problem has many potential applications in telecommunication, hub location, production, and distribution logistics. Her research on two-stage robust network flow/design problem is for the general problem; currently, she is working on applications of this work to problems with special network structures.

Recent Publications


Before my retirement, I was part of the department’s human factors area, otherwise known as engineering psychology. Nowadays I am more of a psychologist than and engineer. Since my retirement in 1999, I have been spending my time writing a series of books.

I have completed twelve and am working on the thirteenth book, mostly concerned with exploring the basic assumptions and principles of scientific psychology. Two of these books were published in the last year—*The Immeasurable Mind* (2007, Prometheus Press) and *Human Factors in the Courtroom* (2006, Lawyers and Judges Publishing)—and two book manuscripts are completed and currently being reviewed by publishers, *Time Space and Number in Physics* and *Psychology and Distributed Neural Systems*. My latest critical writing is on a book tentatively entitled *Neuroscience in the Courtroom*.

This year I was a speaker at a national conference on brain imaging run by the ASU law school. In October, I am an invited keynote speaker at a similar conference run by the Delft University of Technology in the Netherlands. Next February I have been invited to speak at a conference on the philosophy of brain and mind at Guadalajara University in Mexico. Summers are spent on a visiting appointment at the Békésy Laboratory of Neurobiology at the University of Hawaii.

Since my December 2006 retirement, I have been working on three research projects, two of which are based on dissertation research of our graduates. The first, based on the dissertation of Jon Ulrich, Ph.D., is exploring how varying arrow sizes relative to a proximal airplane silhouette’s size affect subject performance. Our intent is to improve directional traffic sign design.

Second is a paper, based on the dissertation research of Randall Gibb, Ph.D, is about identifying which visual cues are most salient for glide path (GP) performance during an approach to landing by a pilot flying in both rich and impoverished visual conditions. Pilot performance suggested a three-phase perceptual process: assess, act, and react. Perceptual learning demonstrated that despite recognition of a black hole approach, pilots confidently flew dangerously low but did improve with practice implying that visual spatial disorientation education and training would be effective if accomplished in flight simulators.

I also am collaborating with colleagues at University of Oklahoma, Purdue University, University of Pittsburgh and University of Nebraska-Lincoln. We examine the achievement of parity of the sexes at the undergraduate level in industrial engineering, the data point to a combination of aspects of the discipline and the department culture as explanatory variables.
2006 Publications

Refereed Journal Articles


Li, F., Runger, G.C., and Tuv, E. “Supervised Learning for Change-point Detection...
2006 Publications

Books & Chapters


2006 Publications


Conference Proceedings


## 2006-2007 Ph.D. Graduate Degrees Advised

### Summer 2006

**Yan Chen**  
*Methodologies for Parameterization of Composite Dispatching Rules*  
Advisor: John Fowler, Michele Pfund  
Placement: Assistant Professor, Macau University of Science and Technology

**Russell Elias**  
*Demand Model Management: A Model-Based Expert System for the Forecasting of Semiconductor Product*  
Advisor: Doug Montgomery  
Placement: independent consultant

**Mohammed Fennich**  
*Stock Market Time-Series Behavior Predictability and Profitability*  
Advisor: Philip Wolfe

**Pornsarun Wirojanagud**  
*Modeling Inherent Worker Differences for Workplace Planning*  
Advisor: John Fowler, Esma Gel  
Placement: independent consultant

### Fall 2006

**Jesus Jimenez**  
*Simulation Modeling Levels to Support Integrated Capacity and AMHS Decision Making in Semiconductor Wafer Fabs*  
Advisor: John Fowler, Gerald Mackulak  
Placement: Assistant Professor, Texas State University

**Hari Balasubramanian**  
*Parallel Machine Bicriteria Scheduling: Some Complexity Results and the Problem of Interfering*  
Advisor: John Fowler, Ahmet Keha  
Placement: Mayo Clinic

**Cem Vardar**  
*A Simulation Optimization Approach to Design Field Service Systems with Remote Diagnostics*  
Advisor: John Fowler, Esma Gel  
Placement: Intel Corp.

**Jeffrey Laub**  
*Scheduling Multiple Orders per Job to Minimize Makespan in Flowshops*  
Advisor: John Fowler  
Placement: General Dynamics

**Suraj Mohandas**  
*Pricing with Efficient Frontiers*  
Advisors: Rajiv Sinha, Mark Henderson  
Placement: Insight

**Fang Li**  
*Finding Heterogeneity in a Multivariate Process*  
Advisor: George Runger  
Placement: American Express

**Yang-Kuei Lin**  
*Data Generation and Heuristics for Unrelated Parallel Machine Scheduling Problems*  
Advisors: John Fowler, Michele Pfund  
Placement: CSX Transportation

### Fall 2006 (continued)

**Ashraf Almimi**  
*Split-Plot Designs: Follow-Up Experiments [sic], Missing Observations, And Model Adequacy*  
Advisors: Murat Kulahci and Douglas Montgomery  
Placement: NASA Postdoctoral Fellow

### Spring 2007

**Randall Gibb**  
*Visual Perception in Aviation: Glide Path Performance During Impoverished Visual Conditions*  
Advisor: William Moor, Rong Pan  
Placement: Air Force Academy, Colorado Springs

**Jon Ulrich**  
*Performance Effects of Varying Traffic Guidance Arrow Size In a Simulated Driving Environment*  
Advisor: William Moor, Stanley Parkinson  
Placement: Faculty Associate, ASU Polytechnic

### Summer 2007

**Jing Hu**  
*Change Detection with Supervised Learning*  
Advisor: George Runger  
Placement: SRP
IE FACULTY

Mary R. Anderson-Rowland, Ph.D.
Statistics and probability for quality control, academic scholarship programs for all engineering students with an emphasis on women and underrepresented minority students.

Ronald G. Askin, Ph.D.
Design and operation of discrete manufacturing systems, production systems, decision analysis, applied operations research, facilities planning, industrial statistics and applied optimization.

Linda Chattin, Ph.D.
Discrete optimization, stochastic processes and probabilistic modeling, emergency service location.

John W. Fowler, Ph.D.
Deterministic scheduling, discrete event simulation methodology, semiconductor manufacturing systems analysis, applied operations research.

Esma S. Gel, Ph.D.
Applied probability, stochastic processes, queuing theory, stochastic modeling and control of manufacturing systems.

Gary L. Hogg, Ph.D.
Applied optimization, simulation, manufacturing planning and control.

Ahmet B. Keha, Ph.D.
Computational and theoretical aspects of integer programming and combinatorial optimization, modern heuristics techniques, logistics and scheduling.

Jing Li, Ph.D.
Applied statistics, process control, data mining, causal modeling and inference.

Gerald T. Mackulak, Ph.D.
Simulation methodology, simulation output analysis, automated production systems, material handling design and analysis.

Douglas C. Montgomery, Ph.D.
Statistical design of experiments, optimization and response surface methodology, empirical stochastic modeling and industrial statistics.

Rong Pan, Ph.D.
Industrial statistics, reliability analysis and time series modeling.

George C. Runger, Ph.D.
Statistical learning, process control and data mining for massive, multivariate data sets with numerous-discipline applications.

Dan L. Shunk, Ph.D.
Agile, enterprise and CIM systems, group technology, planning systems, economics of computer-integrated manufacturing, strategy and strategic role of technology.

William Thompson, Ph.D., P.E.
Lean production systems, engineering management and quality management.

J. René Villalobos, Ph.D.
Manufacturing systems, automated visual inspection, real time quality control and intelligent manufacturing systems.

Teresa Wu, Ph.D.
Information systems, supply chain management, multi-agent systems, data mining, Petri nets and Kalman filtering.

Nong Ye, Ph.D.
Information and systems assurance, security and dependability of computer and network systems, data mining and modeling, systems engineering and management.

Muhong Zhang, Ph.D.
Integer programming, robust optimization, computational optimization, and network optimization.

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James E. Bailey
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