



Operations Research Division

Summer 2016

## *Division Newsletter*

Dear OR Division Members,

As we begin summer, we hope that many of you enjoyed the IIE Annual Conference, which was held in Anaheim California this year!

We hope that you will take a few minutes to look over some of the recent activities and achievements of our members. Our Annual Teaching and Best Paper awards are attracting many outstanding nominations and submissions. Our second Undergraduate Student Research Dissemination Award has resulted in an exciting competition! We are also very fortunate that many of you are willing to serve the division as board members. Three new members will be joining the board this year.

This newsletter is a reprise of many articles from Spring 2016, with exciting new additions to help you plan for the 2016-2017 year!

We look forward to seeing many of you in Pittsburgh in May 2017!

OR Division Board

Look for the IISE OR Division on Social Media!  
Search for "OR Division on IISE"

Find us on   




### Board Members

**President 2016-2017:**  
Sandra D. Eksioglu

**President-elect:**  
Scott Grasman

**President 2015-2016:**  
Mary E. Kurz

**2014-2015  
Past President:**  
Maria Mayorga

**Directors  
2014-2016**  
Lihui Bai  
Nipa Phojanamongkolkij

**2015-2017**  
Ruben A. Proano  
Chase Rainwater  
**2016-2018**  
Katie McConky  
Christina Rinaudo



## AWARD FOR EXCELLENCE IN THE TEACHING OF OPERATIONS RESEARCH 2016

Dr. Murat Kurt and Dr. Thomas Sharkey

**Dr. Murat Kurt**, currently with Merck & Co and recently of the University of Buffalo, Department of Industrial and Systems Engineering, was recognized for the manner in which he inspires students in IE 373: Introduction to Operations Research: Deterministic Models, and the manner in which that inspiration impacts students. The word “enthusiasm” was present in nearly every student endorsement. Dr. Kurt develops relationships with his students so that they want to be successful, and then gives them the tools to be successful. One of the student supporters wrote: “Professor Kurt truly cares about his students and is excited to disseminate his knowledge of Operations Research in any way possible. He’s not just a lecturer, he’s an inspiration.” Dr. Kurt’s nominator, Dr. Mark Karwan, noted that Dr. Kurt motivates the students in this course to become involved in undergraduate research and excels at mentoring undergraduate and graduate students – “injecting them with motivation”!



**Dr. Murat Kurt**



**Dr. Thomas Sharkey**

**Dr. Thomas Sharkey** of Rensselaer Polytechnic Institute’s Department of Industrial and Systems Engineering, is recognized for implementing an effective blended learning environment for ISYE 4600: Operations Research Methods. Dr. John Wen indicates that the environment that Dr. Sharkey has developed is “one that the student love, has been demonstrated to increase student achievement, and is a model for how other courses ... could be effectively enhanced.” While skeptics may be concerned that the use of online video tutorials and virtual office hours may reduce student engagement, Ms. Lauren Croft wrote that Dr. Sharkey “creates an interactive and enthusiastic learning environment”, indicating that the online material really made a difference in helping her learn the material, and that “Professor Sharkey went the extra mile and made the course enjoyable and is the reason why I decided to pursue research.”

Do you have a great OR professor? Or do you work with one?  
Or, let’s be honest – Do you think you are a great OR professor?

Look for the nomination announcement in late December / early January for the  
**AWARD FOR EXCELLENCE IN THE TEACHING OF OPERATIONS RESEARCH**



## OPERATIONS RESEARCH TRACK BEST PAPER AWARD 2016

### “A Separation Method for the Multi-Objective Set Covering Problem”

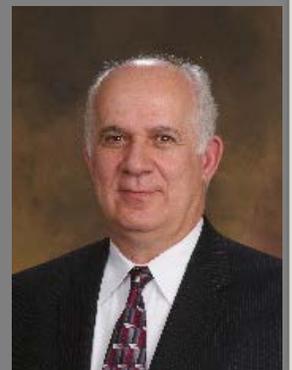
By: Hadi Farhangi, Dinçer Konur, Cihan H. Dagli

**Hadi Farhangi** is a 3<sup>rd</sup> year PhD student in Systems Engineering at the Department of Engineering Management and Systems Engineering at Missouri University of Science and Technology. He holds a M.S. degree in Systems Engineering (2010) from Sharif University of Technology and B.S. degree in Industrial Engineering (2007) from Iran University of Science and Technology. Throughout his doctoral studies, Hadi has been conducting research in multi-objective combinatorial optimization problems and its applications in System of Systems (SoS) architecting. Particularly, his work has been in the analyses of multi-objective mixed-integer linear/nonlinear programming, SoS architecting with flexibility, robustness, and performance improvements. He is a student member of IISE and INFORMS.



**Dinçer Konur** is an Assistant Professor at the Engineering Management and Systems Engineering Department at the Missouri University of Science and Technology since August 2012. He holds a Ph.D. (2011) and a M.S. (2009) degrees in Industrial and Systems Engineering from the University of Florida and a B.S. degree in Industrial Engineering (2007) from Bilkent University, Ankara Turkey. He has worked as a post-doctorate research fellow at the Intermodal Freight Transportation Institute at the University of Memphis from 2011 to 2012. His research interests include operations research and game theory and their applications in the fields of Supply Chain Management, Distribution and Logistics, Transportation, and System of Systems architecting. Specifically, he conducted research in environmental integrated inventory control and transportation, competitive facility location games, multi-objective combinatorial System of Systems architecting problems, truck scheduling and rail inspection scheduling. His research has been funded by US DoD through Systems Engineering Research Center, US DoT through University Transportation Centers, Missouri Department of Transportation, and University of Missouri System. He is a faculty member of IISE, INFORMS, POMS.

**Cihan H. Dagli** is a Fellow of INCOSE and IIE; member of IEEE and NDIA. He is Professor of Engineering Management and Systems Engineering, and Affiliated Professor of Electrical and Computer Engineering at the Missouri University of Science and Technology. He is the Area editor for Intelligent Systems of the International Journal of General Systems. His research interests are in the areas of Systems Architecting and Engineering, System of Systems, Smart Engineering System Design, Computational Intelligence. Dr. Dagli is the founder and Director of the Missouri S&T's System Engineering graduate program. He is the director of Smart Engineering Systems Laboratory and a Senior Investigator in DoD Systems Engineering Research Center-URAC. He has published more than 400 papers in refereed journals and proceedings, 29 edited books and cited 2638 times based on google scholar. He has consulted with various companies and international organizations including The Boeing Company, AT&T, John Deere, Motorola, U.S. Army, UNIDO, and OECD.





Operations Research Division

## *Undergraduate Research Award!*

### **Congratulations**

Finalists in the 2016 OR  
Division Undergraduate  
Student Research  
Dissemination Award

Thank you to the  
2015-2016 sponsors!

Industrial Engineering  
Clemson University

Industrial Engineering  
University of Arkansas

**GOAL:** The goal of this award is to recognize scholarly work as well as ability to effectively communicate results from an undergraduate student or student teams.

**ELIGIBILITY:** The first author of the paper must be a full-time undergraduate student at the time of submission. The paper must present original research conducted while the applicant was a student.

**PROCESS:** The application process will follow the timeline of the proceedings paper submissions. When applicants submit their proceeding abstract they must email the Operations Research division Committee member in charge (Currently Katie McConky ktmeie@rit.edu), requesting that their paper be considered for the award. Then they submit their proceeding paper through the usual ISERC process. Finalists will be selected from among the papers.

The winner is decided based both on their written paper and their oral presentation. Finalists are selected before ISERC, but the winner is announced at ISERC.

**PRIZES:** All finalists will receive a banquet ticket, and cash prizes for 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> places in the amount of \$400, \$200, and \$100 respectively!

## Plan your summer and fall to produce a Winning Paper!

The first author of the paper must be an undergraduate student at the time of submission, and though the work may contain faculty authors, it must be predominantly the work of a student or student team.

Co-authorship is allowed – whether other undergraduates, graduate students, faculty or industry members.

The paper must present original research, the research must have been conducted while the applicant was a student, and the paper must not have won or been considered for an award in another competition.

**Be ready to submit an abstract and Look for More information in Late Fall!**



## **OPERATIONS RESEARCH UNDERGRADUATE RESEARCH DISSEMINATION AWARD RESULTS 2016**

### **First Place**

**Benjamin Rachunok**

**“UAVs Provide Life-Saving Medical Care”**

**North Carolina State University**

Unmanned Aerial Vehicles (UAVs, UAS, or Drones) are expanding from their military provenance to provide unique utility to the private and public sector. UAVs outfitted with automated external defibrillators (AEDs) recently emerged as a practical, humanitarian purpose for the aircraft. The UAV-AED combination has the potential to deliver life-saving defibrillation to a patient experiencing an out of hospital cardiac arrest faster than a traditional ambulance. This paper works to establish criteria for locating and dispatching the UAVs with the goal of reducing response time and hence increasing the likelihood of surviving a cardiac episode. Simulation is used to evaluate the effectiveness of a specific set of parameters governing the location and dispatching of the UAVs as well as what potential vehicle parameters are of importance to the overall results.

This is joint work with Maria Mayorga at North Carolina State University, Cem Saydam at University of North Carolina at Charlotte and Hari Rajagopalan at Francis Marion University in South Carolina.

### **Second Place**

**José Batista Abikarram**

**“Machine Coordination for Minimizing Instantaneous Peak Electricity Demand”**

**Rochester Institute of Technology**

Many commercial and industrial customers are billed by their electric utility in part by their peak electricity demand observed over a certain period of time. As metering infrastructure is improving the window over which peak demand is measured could get smaller and smaller, eventually leading to customers being billed based on instantaneous peak demand. This possible future necessitates a mechanism to reduce the peak instantaneous electricity demand created by commercial and industrial processes while simultaneously not affecting quality of service measures. This research evaluates the feasibility of coordinating the activities of a fleet of computer numerical controlled (CNC) machines in order to reduce the instantaneous peak demand generated by the machines. A discrete event simulation approach is used to demonstrate that the coordination of machines can yield a 10 to 40% reduction on peak load without significantly impacting product throughput, production time or total energy consumed. Results will be presented that demonstrate the impact of machining profile, product mix, and utilization rates on overall peak demand reduction potential.

This is joint work with Katie McConky.

### **Third Place**

**Richard Alaimo, William Cole, Justin Ervin, Hanna Tannous and Kevin Wong**

**“Optimization of Used Nuclear Fuel Shipments”**

**The University of North Carolina at Charlotte**

Nuclear energy has been and still is an important source of energy for citizens all around the globe. However, once nuclear energy is deemed to have been used to its maximum potential, it leaves a byproduct known as spent nuclear fuel that must be stored in wet and dry storage to cool off since the material is extremely warm. This process has been going on for decades and it has gotten to the point where there is too much nuclear material in storage in the United States, and it is time to move it all to a central repository facility for final disposal or recycling. In this study, we consider a shipment and transportation plan for 12 nuclear facilities in the United States that have been decommissioned and currently contain spent nuclear fuel in dry storage. This study is involved with data mining from GIS software that measure multiple railroad routes and estimating costs for transporting the spent fuel. Once this data is acquired, we formulate the problem as a mixed integer program that provides an optimal plan, which includes shipment sequencing, resource allocation, and number of resources to purchase, while minimizing the total cost of moving spent fuel.

This is joint work with Churlzu Lim at University of North Carolina at Charlotte and Sven Bader at AREVA.



The OR Division Board fills three positions each year. This year we are welcoming Scott Grasman, Katie McConky, and Christina Rinaudo to the OR Division Board. Scott will serve as Vice President/President-Elect. Katie and Christina are the new incoming directors. Many thanks to Lihui Bai, Maria Mayorga, and Nipa Phojanamongkolkij, our outgoing members of the board, for their service to the division.

Congratulations to

Scott Grasman  
Katie McConky  
Christina Rinaudo

newly elected  
members to the  
OR Division Board!

Scott will serve as  
president-elect in the  
upcoming year.  
Katie and Christina  
will serve as directors.

### New Board Members:



**Scott Grasman**  
RIT



**Katie McConky**  
RIT



**Christina Rinaudo**  
US Army Corps of  
Engineers

### Continuing Board Members:



**Sandra Eksioglu**  
Clemson University



**Mary E. Kurz**  
Clemson University



**Ruben Proano**  
RIT



**Chase Rainwater**  
Univ. of Arkansas

### Outgoing Board Members:



**Maria Mayorga**  
North Carolina State  
University



**Lihui Bai**  
Univ. of Louisville



**Nipa Phojanamongkolkij**  
NASA Langley



Operations Research Division

*Keep learning all year long with Webinars!*

In the last year, the Operations Research Division sponsored two webinars. You can still enjoy these and other past webinars by visiting <http://www.iienet2.org/default.aspx> and navigating to Training, Webinars, Webinar Archive, Operations or going directly to <http://www.iienet2.org/Details.aspx?id=23052>.

Krishna Jha, Optym

“Using OR to solve freight transportation problems faced by railways”, January 19, 2016

#### **Bio**

Krishna Jha is the Vice President of Research & Development at Optym (formerly Innovative Scheduling). He has been working at Optym since its inception and has led the design and implementation of several decision support systems, including the train scheduling optimizer, the crew scheduling optimizer, yard simulation and optimization systems. Krishna is an expert in network optimization and heuristic techniques. Krishna’s strengths center on efficiently solving highly constrained combinatorial optimization problems. He has a successful track record of designing and deploying products that are tailored to customers’ needs.

Krishna earned his B.S. in Mechanical Engineering from Bihar Institute of Technology, Sindri, India, his M.S. in Industrial and Management Engineering from Indian Institute of Technology, Kanpur, India, and his Ph.D. in Industrial and Systems Engineering from the University of Florida, Gainesville.

#### **Webinar description**

Freight transportation by rail consists of complex decision making processes in planning and execution stages. In this talk, we will introduce you to important business problems and their significances. For two railroad problems, we will also present the solution approaches comprising of cutting-edge optimization techniques to solve these combinatorial problems. We will also describe the need of interactive decision support systems to adopt optimization methods in the real-life.

Bo Zeng, Department of Industrial Engineering, University of Pittsburgh

“A tutorial on bi-level optimization”, March 31, 2016

#### **Bio**

Dr. Bo Zeng is currently an assistant professor in the Department of Industrial Engineering, Swanson School of Engineering, at University of Pittsburgh. Prior to that, he was on the faculty of Industrial and Management Systems Engineering at University of South Florida. His research interests include theory and algorithms for mixed integer programs, multilevel optimization; and analytics tools to support decision making in practical systems. He graduated from Industrial Engineering from Purdue University with a Ph.D. focusing on operations research in 2007.

#### **Webinar description**

This tutorial will cover the fundamental aspects of bi-level optimization, including popular models for interdiction problem, leader-follower game and mathematical program with equilibrium constraints (MPEC), their structural properties and popular computational methods, and typical industrial applications on pricing, energy market, and system reliability and security.

Be on the lookout for the 2016-2017 Operations Research Webinar Offerings!

Coordinated by Scott Grasman ([scott.grasman@rit.edu](mailto:scott.grasman@rit.edu))

Thanks to our 2015-2016 Webinar Coordinator: Sandra Eksioglu ([seksiog@clemson.edu](mailto:seksiog@clemson.edu))



## *What happened in Anaheim?*

The recent IISE Annual Meeting and Expo featured OR Tracks in both the Industrial and Systems Engineering Research Conference (ISERC) and the Applied Solutions Conference.

	<b>Session Title</b>	<b>Session Time</b>
05/22/16	In Disneyland North Exhibit Hall I - Fantasy Tower Unless Otherwise Noted	
	Optimization Problems in Manufacturing, Production and Scheduling	8:00 AM
	Models & Methodologies to Address New Scheduling Challenges Across Multiple Industries	11:00 AM
	Operations Research in Government and Service Sectors	12:30 PM
	Operations Research in Homeland Security	2:00 PM
	Optimization Advancements: Graphs, Trees and Information Diffusion	3:30 PM
	Models and Methodologies for Decision Estimation, Evaluation and Analysis	5:00 PM
05/23/16	In Disneyland North Exhibit Hall I - Fantasy Tower Unless Otherwise Noted	
	Scheduling for Medical Trainees (Invited) *	8:00 AM
	Student Paper Competition: Operations Research Division	8:00 AM
	Resilient Network Applications	11:00 AM
	Operations Research in Aerospace	12:30 PM
	Robust Optimization	2:00 PM
	Operations Research in Healthcare, Security and Food Science	3:30 PM
	Resource Planning & Scheduling in Operations 2 **	3:30 PM
TOWN HALL in MAGIC KINGDOM BALLROOM 4 – FANTASY TOWER	5:00 PM	
05/24/16	In Disneyland North Exhibit Hall I - Fantasy Tower Unless Otherwise Noted	
	Production Planning & Scheduling 2 ***	8:00 AM
	Various Problems in Bicycle Sharing Systems and Public Transportation	11:00 AM
	Advancements in Assignment and Knapsack Problems: Algorithms and Methodologies	12:30 PM
	Advancements in Operations Research Methodologies for Addressing Healthcare Challenges	2:00 PM
	Optimization Advancements: Transportation Scheduling and Routing	3:30 PM

\* Location: Amazon - Adventure Tower

\*\* Location: Magic Kingdom Ballroom 4 - Fantasy Tower

\*\*\* Location: Magic Kingdom Ballroom 1 - Fantasy Tower

Operations Research Track co-chairs:

John Fowler (john.fowler@asu.edu)

Shrikant Jarugumilli (Shrikant.Jarugumilli@bnsf.com)

Nipa Phojanamongkolkij (nipa.phojanamongkolkij@nasa.gov)

Chase Rainwater (cer@uark.edu)

Christina Rinaudo (Christina.H.Rinaudo@erdc.dren.mil)

Be sure to volunteer to  
organize a session in the  
2017 IISE Conference!

Look for the call in Fall 2016