

Seok Gi Lee

Industrial and Systems Engineering, Rayen School of Engineering,
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RESEARCH INTERESTS

Methodologies: simulation-based optimization, machine learning, feedback control, distributed system control, matheuristics, meta-heuristics

Applications: learning-based manufacturing and transportation management, sharing economy in material-handling and transportation systems, outpatient scheduling and drug inventory control, predictive analytics for prevention services, statistical analysis for opioid/emergency department/orthopaedic studies

TEACHING INTERESTS

Undergraduate level: operations research (deterministic & stochastic), discrete-event system simulation, production and inventory control, supply chain and logistics systems, design of manufacturing systems, engineering statistics, machine learning (reinforcement learning), database management systems, objected-oriented programming

Graduate level: advanced production and inventory systems, production scheduling, simulation-based optimization, stochastic dynamic programming, networks and algorithms, decision analysis, applied engineering statistics

APPOINTMENTS

Assistant Professor Fall 2021 – present
Industrial and Systems Engineering, Rayen School of Engineering
Youngstown State University, OH

Assistant Professor Fall 2014 – Spring 2021
Department of Industrial and Systems Engineering,
University of Miami, FL

Associate Fall 2017 – present
Department of Mental Health,
Johns Hopkins University, MD

Visiting Fellow 2017
Yonsei Institute of Sports Science and Exercise Medicine,
Yonsei University, South Korea

Post-doctoral Researcher 2014
Department of Industrial and Manufacturing Engineering,

Pennsylvania State University, PA

Post-doctoral Researcher, System Consultant 2013

Department of Mental Health,
Johns Hopkins University, MD

Instructor 2011 – 2013

Department of Industrial and Manufacturing Engineering,
Pennsylvania State University, PA

Research Assistant 2008 – 2010

Department of Industrial and Manufacturing Engineering,
Pennsylvania State University, PA

HIGHER EDUCATION

The Pennsylvania State University, University Park, Pennsylvania 2013

- Ph.D. in Industrial and Manufacturing Engineering
- Advisor: Dr. Vittaldas V. Prabhu
- Dissertation: Supply Chain Servo Control: Models and Algorithms

Hanyang University, Seoul, South Korea 2001

- M.S. in Industrial Engineering
- Thesis: The Weight Initialization of Self-Organizing Neural Networks Using Convex Hull for the Euclidean Traveling Salesman Problem

Hanyang University, Seoul, South Korea 1999

- B.S. in Industrial Engineering

PUBLICATIONS

Journal Articles

(† = Corresponding author)

- Dies, R., Manuel, J., Zhang, A., Mody, M., **Lee, S.**, Root, M., Carroll, T., Mbagwu, C., Solitro, G., (2024) Impact of Bone Density and Integrated Screw Configuration on Standalone Anterior Lumbar Interbody Construct Strength, *North American Spine Society Journal* (Accepted)
- Kim, J., Kweon, SJ., Hwang, SW., **Lee, S.**, (2024) Crowdsourcing integration on the last mile delivery platform considering floating population data, *Expert Systems with Applications* (Accepted)
- Bok, Y., Lee, NK., Jo, S., **Lee, S.**, Na, HS., Kweon, SJ., (2023). The production scheduling problem employing non-identical parallel machines with due dates considering carbon emissions and multiple types of energy sources, *Expert Systems with Applications* (Accepted)
- Kweon, SJ., Hwang, SW., **Lee, S.**†, & Jo, MJ., (2022). Demurrage pattern analysis using logical analysis of data: a case study of the Ulsan Port Authority. *Expert Systems with Applications*. 117745.

- Kang, H. †, Zhang, P., Lee, S., Shen, S., Dunham, E., (2022). Racial disparities in opioid administration and prescribing in the emergency department for pain, *American Journal of Emergency Medicine*, 55, 167-173.
- Lee, S.†, HW. Jeon, Issabakhsh, M., & Ahmad, E., (2021). An electric forklift routing problem with battery charging and energy penalty constraints. *Journal of Intelligent Manufacturing*, 1-17. <https://doi.org/10.1007/s10845-021-01763-6>
- Hwang, SW., Lee, S., & Kweon, SJ.†, (2021). An integrated inventory and distribution problem for alternative fuel: a math-heuristic approach. *European Journal of Industrial Engineering*, 15(5), 711-744
- Issabakhsh, M., Lee, S.†, & Kang, H., (2020). Scheduling patient appointment in an infusion center: A mixed integer robust optimization approach. *Health Care Management Science*, 24(1), 117-139. <https://doi.org/10.1007/s10729-020-09519-z>
- Kim, Y. G., Lee, S., Son, J., Bae, H., & Do Chung, B. †, (2020). Multi-agent system and reinforcement learning approach for distributed intelligence in a flexible smart manufacturing system. *Journal of Manufacturing Systems*, 57, 440-450. <https://doi.org/10.1016/j.jmsy.2020.11.004>
- Lee, S., Jeon, HW., Issabakhsh, M., & Chung, BD. †, (2020). Idle time and capacity control for a single machine scheduling problem with dynamic electricity pricing. *Operations Management Research*, 13, 197-217. <https://doi.org/10.1007/s12063-020-00156-x>
- Al-Barghouthi, A., Lee, S., Solitro, G., Latta, L., Travascio, F.†, (2020). Relationships Among Bone Morphological Parameters and Mechanical Properties of Cadaveric Human Vertebral Cancellous Bone. *Journal of Bone Mineral Research Plus*, e10351. <https://doi.org/10.1002/jbm4.10351>
- Ebrahimi, A., Jeon, HW., Lee, S., Wang C. (2020). Minimizing total energy cost and tardiness penalty for a scheduling-layout problem in a flexible job shop system: A comparison of four metaheuristic algorithms. *Computers & Industrial Engineering*, 141, 106295 <https://doi.org/10.1016/j.cie.2020.106295>
- Kang, Y.†, Lee, S., & Do Chung, B. (2019). Learning-based logistics planning and scheduling for crowdsourced parcel delivery. *Computers & Industrial Engineering*, 132, 271-279 <https://doi.org/10.1016/j.cie.2019.04.044>
- Jeon, H. W.†, Lee, S., & Wang, C. (2019). Estimating manufacturing electricity costs by simulating dependence between production parameters. *Robotics and Computer-Integrated Manufacturing*, 55, 129-140. <https://doi.org/10.1016/j.rcim.2018.07.009>
- Lee, S.†, Do Chung, B., Jeon, H. W., & Chang, J. (2017). A dynamic control approach for energy-efficient production scheduling on a single machine under time-varying electricity pricing. *Journal of Cleaner Production*, 165, 552-563. <http://dx.doi.org/10.1016/j.jclepro.2017.07.102>
- Jeon, H. W.†, Lee, S., Kargarian, A., & Kang, Y. (2017). Power demand risk models on milling machines. *Journal of Cleaner Production*, 165, 1215-1228. <http://dx.doi.org/10.1016/j.jclepro.2017.07.101>
- Lee, S.†, & Prabhu, V. V. (2016). Just-in-time delivery for green fleets: A feedback control approach. *Transportation Research Part D: Transport and Environment*, 46, 229-245 <http://dx.doi.org/10.1016/j.trd.2016.04.005>

- **Lee, S., Kang, Y., Ialongo, N. S., & Prabhu, V. V.[†]** (2016). Predictive analytics for delivering prevention services. *Expert Systems with Applications*, 55, 469-479
<http://dx.doi.org/10.1016/j.eswa.2016.02.023>
- **Lee, S.[†], Kang, Y., & Prabhu, V. V.** (2016). Smart logistics: distributed control of green crowdsourced parcel services. *International Journal of Production Research*, 54(23), 6956-6968
<https://doi.org/10.1080/00207543.2015.1132856>
- **Lee, S., & Prabhu, V. V.[†]** (2015). Energy-aware feedback control for production scheduling and capacity control. *International Journal of Production Research*, 53(23), 7158-7170
<https://doi.org/10.1080/00207543.2015.1082666>
- **Lee, S., & Prabhu, V.V.[†]** (2014). A dynamic algorithm for distributed feedback control for manufacturing production, capacity, and maintenance. *IEEE Transactions on Automation Science and Engineering*, 12(2), 628-641. <https://doi.org/10.1109/TASE.2014.2339281>

Articles Under Review

- Shipley, T., Saxena, T., **Lee, S.**, Adcock, W., Bilderback, K., Barton, S., Solitro, G., Effects of A2 pulley venting on bowstringing and tendon slack: a biomechanical investigation, *HAND* (under 1st review)
- Yoon, S., Jung, SU., Kweon, SJ., **Lee, S.**, Na, HS., A strategic plan to provide management services for urban green spaces during heat waves using a collaborative truck-and-robot system, *Urban Climate* (under 1st review)

Book Chapters:

- Anand, V., **Lee, S.**, & Prabhu, V. V., Energy-aware models for warehousing operations. In *Advances in Production Management Systems, Innovative and Knowledge-Based Production Management in a Global-Local World*, Springer Berlin Heidelberg, (2014). pp. 390-397
- **Lee, S.**, & Prabhu, V. V., Distributed feedback control for production, inventory, and CO2 emissions in an assemble-to-order system, *Service Orientation in Holonic and Multi-Agent Manufacturing and Robotics*, Springer International Publishing, (2014). pp. 15–29

Other Works, Publications and Abstracts:

- Kevin Perry, Connor Plaisance, Seok Gi Lee, Brad Chauvin, Kamren Sutton, Drayton Daily, R Shane Barton, Giovanni F Solitro (2023). Entry Point Position and Screw Length in Pelvic Anterior Column Screw Fixation, *Orthopaedic-Trauma-Association Annual Meeting* (participate for statistical analysis)
- Dies, R., Manuel, J., Mody, M., Zhang, A., **Lee, S.**, Root, M., Mbagwu, C., Solitro, G. (2022). Anterior Lumbar Interbody Fusion Construct Strength In Relation To Bone Density And Number Of Screws Used: An Experimental Study On Bone Surrogates. *Orthopaedic Research Society Annual Meeting* (participate for statistical analysis)
- Plaisance, C., Perry, K., **Lee, S.**, Chauvin, B., Sutton, K., Daily, D., Barton, S., Solitro, G. (2022). Relationship between entry point position and screw length in pelvic anterior column fixation. *Orthopaedic Research Society Annual Meeting* (participate for statistical analysis)
- Lee, S. Y., **Lee, S.**, Kang, Y., Chun, Y. M., Kim, C. Y., & Kong, I. D. (2017). Investigation of the lower extremity static postures predicting valgus collapse during drop landing in Korean male and female—Logical Analysis of Data (LAD) approach. *Br J Sports Med*, 51(4), 348-349

<http://dx.doi.org/10.1136/bjsports-2016-097372.165> (participate for statistical analysis and machine learning)

Refereed Conference Proceedings

- Issabakhsh, M., **Lee, S.**, & Kang, H., (2022) A Hierarchical Deep Reinforcement Learning Approach for Outpatient Primary Care Scheduling, Winter Simulation Conference, Singapore, December, 2022
- Issabakhsh, M., **Lee, S.**, & Kang, H., (2018) A Mixed Integer Programming Model for Patient Appointment in an Infusion Center, Institute of Industrial and Systems Engineers Conference, Orlando, FL, USA, May, 2018
- Lee, S. Y., **Lee, S.**, Kang, Y., Chun, Y. M., Kim, C. Y., & Kong, I. D. (2017). Investigation of The Lower Extremity Static Postures Predicting Valgus Collapse During Drop Landing In Korean Male and Female–Logical Analysis Of Data (LAD) Approach. *Br J Sports Med*, 51(4), 348-349
- Jeon, HW., & **Lee, S.**, (2016) Manufacturing Energy Consumption Model for Product Mix and Design, International Conference on Flexible Automation and Intelligent Manufacturing, (FAIM) South Korea, 2016
- Anand Vidyuth, **Lee, S.**, & Prabhu, V. V., (2014). Energy-Aware Models for Warehousing Operations, Advances in Production Management Systems (APMS) International Conference, Ajaccio, France, 2014
- **Lee, S.**, Kang, Y., & Prabhu, V. V., (2013). Continuous Variable Approach for Homecare Crew Scheduling, Winter Simulation Conference, Washington DC, USA, December, 2013
- **Lee, S.**, & Prabhu, V. V., (2013). Distributed Controllers for Managing Emissions in a Manufacturing Supply Chain, International Workshop on Service Orientation in Holonic and Multi Agent Manufacturing and Robotics, Valenciennes, France, June, 2013
- **Lee, S.**, & Prabhu, V. V., (2011). Real-time Feedback Control for Production, Maintenance, and Capacity, International Conference on Industrial Engineering and Systems Management, Metz, France, May, 2011
- **Lee, S.**, & Prabhu, V. V., (2010). Simulation-based Control for Green Transportation with High Delivery Service, Winter Simulation Conference, Baltimore, MD, USA, December, 2010
- Chang, J., Jung, K., Hwang, J., Kang, Y., **Lee, S.**, & Freivalds, A., (2010). Determination of Bicycle Handle Diameters Considering Hand Anthropometric Data and User Satisfaction. The Human Factors and Ergonomics Society 54rd Annual Meeting. San Francisco, California: The Human Factors and Ergonomics Society
- **Lee, S.**, & Prabhu, V. V., (2009). Distributed Arrival Time Control for Vehicle Routing Problem with Time Windows, International Conference on Informatics in Control, Automation, and Robotics, Italy, July
- **Lee, S.**, & Prabhu, V. V., (2009). Performance of Truck Assignment and Routing Algorithm, Industrial Engineering Research Conference, Miami, FL, USA, June

- **Lee, S., & Prabhu, V. V., (2008).** Real-Time Truck Routing for Optimizing Energy Cost and Delivery Service, Proceedings of 50th national Convention of Industrial Engineers and International Seminar, India, December
- **Lee, S., & Kang, M., (2000).** A New Structure of Self-Organizing Neural Networks for the Euclidean Traveling Salesman Problem. Society of Korea Industrial and Systems Engineering, Seoul, South Korea, 2000

GRANTS

- Web-based application development for assessment and prediction of study participant outcomes, Johns Hopkins University Preventive Intervention Research Center (JHU PIRC), 8/2021 – present
- Smart maritime accelerator center, Ulsan National Institute of Science and Technology (UNIST) & Ulsan Port Authority (UPA), Republic of Korea, 5/2019 – 12/2019
- Real-time data collection and analysis system management, Johns Hopkins University Preventive Intervention Research Center (JHU PIRC), 8/2019 – 11/2019
- Unified Dynamic Control for Energy-Aware Electrical Vehicle Operations, University Research Program, TOYOTA MATERIAL HANDLING NORTH AMERICA (TMHNA), 1/2018 – 12/2018
- Development of Integrated Decision-Making Framework and Software for Crowdsourced Parcel Delivery Service with Load Packing Optimization, LOGEN SOLUTIONS USA (grant originally from FIAT-CHRYSLER AUTOMOBILES (FCA) USA), 11/2017 – 10/2018
- Optimization Approach for Injury Prevention Study. Yonsei Institute of Sports Science and Exercise Medicine, South Korea, 3/2017 – 2/2018
- An Evaluation of an Integrated Approach to Prevention and Early Intervention in Elementary School. Johns Hopkins University Preventive Intervention Research Center (grant originally from NIH R01DA039869), 11/2016 – 3/2017
- Predictive Analytics for Delivering Prevention Services. Johns Hopkins University, Preventive Intervention Research Center (sub-award, grant originally from NIH), 10/2013 – 12/2013

HONORS & AWARDS

- Research Professorship, Youngstown State University, 2022, 2023
- Provost Research Award for the research project titled “Detecting hidden characteristics of patients administered or prescribed opioids in emergency departments”, University of Miami, 2021
- SME Journal Award – Outstanding reviewer award for the Journal of Manufacturing Systems by Society of Manufacturing Engineers, 2018
- Scholarship for international collaborative research – Construction of multi-product dynamic flexible production scheduling algorithm applying deep reinforcement learning corresponding to uncertainty, Yonsei University, South Korea, 2018
- Yonsei Institute of Sports Science and Exercise Medicine (YISSEM) Fellowship to support a research visit at Yonsei University, South Korea, 2017

- Post-Doctoral Fellowships - Penn State University, Department of Industrial and Manufacturing engineering, 2014

TEACHING EXPERIENCES

Instructor

Youngstown State University, Youngstown, OH

ISEN 3727: Simulation of Industrial Engineering Systems – Undergraduate	Spring 2023
ISEN 3716: System Analysis and Design – Undergraduate	Spring 2022
ISEN 3710: Engineering Statistics – Undergraduate	Fall 2021 – Summer 2023
ISEN 4844: Capstone Design 2 – Undergraduate	Spring 2023
ISEN 5801: Operations Research 1 – Undergraduate	Fall 2023 – present
ISEN 6921: Engineering Statistics – Graduate	Spring 2023
ISEN 6935: Decision Analysis for Engineering – Graduate	Spring 2022

Instructor

University of Miami, Coral Gables, FL

ISE 507: Design of Manufacturing Systems – Undergraduate/Graduate	Fall 2023
IEN 465: Production and Inventory Control – Undergraduate	2014 – 2021
IEN 765: Advanced Production Systems - Graduate	2017 – 2022
IEN 441: Deterministic Models in Operations Research – Undergraduate	Fall 2014

Instructor

Pennsylvania State University, University Park, PA

IE330: Information Technology for Industrial Engineering	2011 – 2013
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INDUSTRY EXPERIENCES

Research Assistant, Gyeonggi Research Institute, South Korea 2006 - 2007

- Analyzed bioscience industry in South Korea.
- Explored the long-term management strategy of Bio-Centers.
- Studied practical management strategy and process for new medicine development.

Project Manager, System Consultant, LG CNS Co., Ltd., South Korea 2004 – 2005

- Led logistics projects at LG Electronics to proposed simulation methods using heuristic algorithms for moving and picking process at warehouse, reducing approximately 15% of picking distance and 20% of picking time; logistics managers were able to make decisions about order fulfillment to minimize inventory cost.
- Designed and developed RF Terminal system and database system to control warehouse process of LG Electronics, South Korea, Netherlands and China; reduced material handling time and improved working accuracy.

Computer Programmer, System Consultant, ERHouse Co., Ltd., South Korea 2001 – 2003

- Led information strategy plan project for third-party logistics company in South Korea.

- Developed supply chain management system of global third-party logistics company, headquartered in Singapore; worked at Singapore headquarters as leader to design system process and architecture.
- Consulted for Samsung electronics to optimize mobilization materials between distribution centers in the U.S., located in San Diego, California and production bases in South Korea; reduced logistics cost to transport products between South Korea and U.S.

PROFESSIONAL SERVICES

Editorial Board

Journal of Manufacturing Systems by SME

2017 – present

Journal Refereed

Journal of Manufacturing Systems, International Journal of Production Research, International Journal of Production Economics, International Journal of Services Operations and Informatics, Journal of Intelligent Manufacturing, International Journal of Computer Integrated Manufacturing, Journal of Cleaner Production, Computers and Operations Research, Computers and Industrial Engineering, Health Care Management Science

Professional and Honorary Organizations

- Institute of Industrial and Systems Engineers (IISE)
- INFORMS
- Society of Manufacturing Engineers (SME)

Other Professional Activities

- UNIST (Ulsan National Institute of Science and Technology), South Korea, December, 2022 (Invited lecture): An Optimal Order Consolidation Policy in Last-Mile Delivery: Deep Q Learning Approach
- INFORMS Annual Meeting, October, 2023: Distributed Feedback Control Algorithm Combined With Deep Q Learning For Energy-aware Last-mile Delivery
- INFORMS Annual Meeting, October, 2023: An Optimal Order Consolidation Policy for Last-Mile Delivery: A Deep Q-Learning Approach to Vehicle Routing Plans
- Ewha Womans University, South Korea, May, 2023 (Invited lecture): An optimal consolidation policy in last-mile delivery: Deep Q learning approach
- UNIST (Ulsan National Institute of Science and Technology), South Korea, December, 2022 (Invited lecture): Optimal order consolidation policy in last-mile delivery: reinforcement learning approach
- Winter Simulation Conference, December, 2022: A Hierarchical Deep Reinforcement Learning Approach for Outpatient Primary Care Scheduling
- INFORMS Annual Meeting, October, 2022: Temporal Analysis of Frequent Emergency Department Visits: A Machine Learning Approach
- INFORMS Annual Meeting, October, 2022: An Optimal Order Consolidation Policy in Last-mile Delivery
- UNIST (Ulsan National Institute of Science and Technology), South Korea, July, 2022 (Invited talk): Green transportation strategy and opportunities

- UNIST (Ulsan National Institute of Science and Technology), South Korea, November, 2021 (Invited lecture): Energy-aware electric material handling vehicle control
- Yonsei University, Seoul, South Korea, October, 2021 (Invited talk): Unified dynamic control for electric material handling vehicle
- UNIST (Ulsan National Institute of Science and Technology), South Korea, May, 2021 (Invited lecture): Energy-aware dynamic control for production scheduling under time-varying electricity pricing
- INFORMS Annual Meeting, November, 2020: A simulation-based optimization approach for integrated cancer outpatient flow and medication management
- INFORMS Annual Meeting, October, 2019: A predictive analytics model for opioid treatment completion
- INFORMS Annual Meeting, October, 2019: Multi appointment infusion therapy scheduling problem with uncertainty
- IISE Annual Conference, May, 2019: A Stochastic programming model for infusion appointment with uncertainty
- IISE Annual Conference, May, 2018: A Mixed Integer Programming Model for Patient Appointment in an Infusion Center
- IISE Annual Conference, May, 2018: A Futuristic Logistics Service System using Reinforcement Learning and Real-time Route Scheduling
- IISE Annual Conference, May, 2018: A robust adaptive large neighborhood search for home healthcare
- INFORMS Annual Meeting, November, 2018: A Unified Dynamic Control for Energy-Aware Electrical Vehicle Operations
- IISE Annual Conference, May, 2017 (Invited Talk, Session Chair): A Mixed Integer Programming Model for Patient Appointment in an Infusion Center
- IISE Annual Conference, May, 2017 (Invited Talk, Session Chair): Distributed Feedback Control Approach for Energy-Aware Manufacturing and Transportation Systems
- YISSEM Annual International Symposium, April, 2017 (Invited Speaker: all travel costs are supported): Evidence-Based Prevention & Protection of Athletic Health, Yonsei Institute of Sports Science and Exercise Medicine (YISSEM)
- INFORMS Annual Meeting, November, 2016, (Invited Talk, Session Chair): A Dynamic Control Algorithm for Distributed Feedback Control for Manufacturing Production, Capacity, And Maintenance
- Industrial and Systems Engineering Research Conference (Invited Talk, Session Chair), May, 2016: An Effective Discriminant Function for Diagnosing Children's Mental Health
- National Institute of Standards and Technology (NIST), July, 2015 (Invited Technical Seminar): Unified Dynamic Control Models and Algorithms for Manufacturing Operations Management. (joint presentation with Vittaldas V. Prabhu)

- Industrial and Systems Engineering Research Conference (Invited Talk, Session Chair), May, 2015: Integrated Real-Time Decision Making – Models and Algorithms
- Industrial and Systems Engineering Research Conference (Invited Talk, Session Chair), May, 2015: Predictive Analytics for Delivering Prevention Services
- Biennial Workshop in Service Engineering, September, 2014 (Invited Session Chair): Energy-Aware Supply Chain Servo Control: Feedback Control Approach
- INFORMS Annual Meeting, October, 2012: Distributed Feedback Control for Production, Inventory, and GHG Emissions
- Winter Simulation Conference, December, 2011: Distributed Feedback Control for Green Transportation
- Winter Simulation Conference, December, 2011: Investigating the Impact of a Feedback Control in Multiple Stage Blood Drive System
- Winter Simulation Conference, December, 2010: Simulation-based Control for Green Transportation with High Delivery Service
- Penn State Enterprise Integration Consortium Meeting, April 3, 2011: Real-time Feedback Control for Green Transportation with High Delivery Service
- Industrial Engineering Research Conference, June 2009: Performance of Truck Assignment and Routing Algorithm

UNIVERSITY COMMITTEE AND ADMINISTRATIVE RESPONSIBILITIES

- Advisor of IISE Student Chapter, Youngstown State University, 2022 – present
- Committee of New Faculty Search in ISEN, Youngstown State University, 2021 – present
- Committee of the College of Engineering College Council, University of Miami, 2020 to 2021
- Committee chair of PhD recruitment in IEN, University of Miami, 2020 – 2021
- Committee of PhD Qualifying Exam in IEN, University of Miami, 2019 – 2021
- IEN Seminar Search Committee of the Department of Industrial Engineering, University of Miami, 2018 – 2021
- Session Organizer for the College of Engineering Research Day, University of Miami, 2019