

Hugh R Medal

Curriculum Vitae

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Education and Training

Ph.D.	Industrial Engineering	University of Arkansas
M.S.	Industrial Engineering	University of Arkansas
B.S.(Hons)	Industrial Engineering	North Dakota State University

Experience

2018–	Assistant Professor , Dept. of Industrial and Systems Engineering	University of Tennessee
2014–2018	Affiliate Faculty , Distributed Analytics and Security Institute	Mississippi State University
2013–2018	Affiliate Faculty , Center for Advanced Vehicular Systems	Mississippi State University
2012–2018	Assistant Professor , Dept. of Industrial and Systems Engineering	Mississippi State University

Interests and Expertise

Application Expertise

<i>Protecting Infrastructure Systems Against Hazards</i>	protecting wireless networks from jamming attacks; information/cyber system security; mitigating against disruptions in distribution and transportation networks
<i>Disaster Mitigation and Response</i>	wildland fire mitigation; optimal post-disaster data collection
<i>Transportation and Supply Chain Network Optimization</i>	network design and facility location problems

Methodological Expertise

Mathematical optimization stochastic programming (especially decision-dependent uncertainty); bi-level programming; integer programming (especially decomposition techniques)

Teaching Interests

<i>Undergraduate</i>	linear programming, production control, logistics
<i>Graduate</i>	network flows, stochastic programming, integer programming

Publications

Peer-reviewed journal articles: published

1. **Medal, H.**, Sharp, S., E. Pohl, S. J. Mason, and C. Rainwater (2011). Models for Reducing the Risk of Critical Networked Infrastructures. *International Journal of Risk Assessment and Management* **15**(2/3), 99–127.
2. **Gedik, R.**, **Medal, H.**, C. Rainwater, E. Pohl, and S. Mason (2014). Vulnerability Assessment and Re-routing of Freight Trains Under Disruptions: A Coal Supply Chain Network Application. *Transportation Research Part E* **71**, 45–57.
3. **Hernandez, I.**, J. E. Ramirez-Marquez, C. Rainwater, E. Pohl, and **Medal, H.** (2014). Robust Facility Location: Hedging Against Failures. *Reliability Engineering and System Safety* **123**, 73–80.
4. **Medal, H.**, E. A. Pohl, and M. D. Rossetti (2014). A Multi-objective Integrated Facility Location-Hardening Model: Analyzing the Pre- and Post-Disruption Tradeoff. *European Journal of Operational Research* **237**, 257–270.
5. **Medal, H.**, C. Rainwater, E. Pohl, and M. Rossetti (2014). A Bi-objective Analysis of the R-All-Neighbor P-Center Problem. *Computers and Industrial Engineering* **72**, 114–128.
6. **Medal, H.** (2016). The wireless network jamming problem subject to protocol interference. *Networks* **67**(2), 111–125.

7. **Medal, H.**, E. Pohl, and M. Rossetti (2016). Allocating Protection Resources to Facilities When the Effect of Protection is Uncertain. *IIE Transactions* **48**(3), 220–234.
8. **Nandi, A. K.** and **Medal, H.** (2016). Models for removing links in a network to minimize the spread of infections. *Computers and Operations Research* **69**, 10–24.
9. **Nandi, A. K.**, **Medal, H.**, and **Vadlamani, S.** (2016b). Interdicting attack graphs to protect organizations from cyber attacks: a bi-level defender-attacker model. *Computers and Operations Research* **75**, 118–131.
10. **Rashidi, E.**, **Parsafard, M.**, **Medal, H.**, and X. Li (2016). Optimal traffic calming: A mixed-integer bi-level programming model for locating sidewalks and crosswalks in a multimodal transportation network to maximize pedestrians' safety and network usability. *Transportation Research Part E* **91**, 33–50.
11. **Sherwin, M.**, **Medal, H.**, and S. Lapp (2016). Proactive Cost-Effective Identification and Mitigation of Supply Delay Risks in a Low Volume High Value Supply Chain Using Fault-Tree Analysis. *International Journal of Production Economics* **175**, 153–163.
12. **Vadlamani, S.**, B. Eksioglu, **Medal, H.**, and **Nandi, A. K.** (2016). Jamming Attacks on Wireless Networks: A Comprehensive Taxonomical Survey. *International Journal of Production Economics* **172**, 76–94.
13. **Chowdhury, S.**, **Khanzadeh, M.**, **Akula, R.**, **Zhang, F.**, **S. Zhang, Medal, H.**, M. Marufuzzaman, and L. Bian (2017). Bot-net detection using graph-based feature clustering. *Journal of Big Data* **4**(14).
14. **Hoskins, A.** and **Medal, H.** (2017b). Stochastic Programming Solution for Placement of Satellite Ground Stations. *Annals of Operations Research*, 1–22.
15. **Rashidi, E.**, **Medal, H.**, J. Gordon, R. Grala, and M. Varner (2017). A maximal covering location-based model for analyzing the vulnerability of landscapes to wildfires: Assessing the worst-case scenario. *European Journal of Operational Research* **258**(3), 1095–1105.
16. **Schweitzer, D.**, **Jafari, R.**, and **Medal, H.** (2017). Analyzing the Vulnerability of an Array of Wireless Access Points. *Computers and Industrial Engineering* **107**, 25–38.
17. **Hoskins, A.**, **Medal, H.**, and **Rashidi, E.** (2018). Satellite Constellation Design for Forest Fire Monitoring Via a Stochastic Programming Approach. *Naval Research Logistics* **64**(8), 642–661.
18. **Rashidi, E.**, **Hoskins, A.**, and **Medal, H.** (2018). Mitigating a pyro-terror attack using fuel management. *IIE Transactions* **50**(6), 499–511.
19. **Rashidi, E.**, **Medal, H.**, and **Hoskins, A.** (2018). An attacker-defender model for analyzing the vulnerability of initial attack in wildfire suppression. *Naval Research Logistics* **65**(2), 120–134.
20. **Vadlamani, S.**, **Medal, H.**, B. Eksioglu, and **Nandi, A. K.** (2018). A mixed-integer programming approach for optimizing flow jamming attacks. *Computers and Operations Research* **95**, 83–96.
21. **Huff, J. D.**, **Medal, H.**, and K. A. Griendling (2019). A Model-Based Systems Engineering Approach to Critical Infrastructure Vulnerability Assessment and Decision Analysis. *Systems Engineering* **22**(2), 114–133.
22. **Li, X.**, **Medal, H.**, and X. Qu (2019). Connected Infrastructure Network Design Under Additive Service Utilities. *Transportation Research Part B* **120**, 99–124.

Peer-reviewed journal articles: accepted

1. **Bhuiyan, T. H.**, **Moseley, M.**, **Medal, H.**, E. Rashidi, and R. Grala (2019). A stochastic programming model with endogenous uncertainty for incentivizing fuel reduction treatment under uncertain landowner behavior. *European Journal of Operational Research* **277**(2), 699–718.
2. **David Schweitzer** and **Medal, H.** (2019c). Wireless LAN transmitter location under the threat of jamming attacks. *Computers and Operations Research* **106**, 14–27.
3. **Mike Sherwin**, **Medal, H.**, C. Mackenzie, and **Kennedy J. Brown** (2019). An optimized resource allocation approach to identify and mitigate supply chain risks using fault-tree analysis. *accepted in IIE Transactions*.

Peer-reviewed journal articles: under review

1. **Huff, J. D.**, **Leonard, W.**, B. Smith, K. Griendling, and **Medal, H.** (2016). NATO Human View Executable Architectures for Critical Infrastructure Analysis. *under review for Engineering Management Journal*.
2. **Bhuiyan, T. H.** and **Medal, H.** (2018). Network Design and Facility Protection when the Effect of Protection is Uncertain. *under review for European Journal of Operational Research*.
3. **Bhuiyan, T. H.**, **Nandi, A. K.**, **Medal, H.**, and M. Halappanavar (2019). Risk-averse Bi-level Stochastic Network Interdiction Model for Cyber-security. *under review for Computers and Industrial Engineering*.

Peer-reviewed journal articles: working drafts¹

1. Hoskins, A. and Medal, H. (2017a). *Initial Orbit Selection For Forest Fire Monitoring with Descending Pass Observations*. Tech. rep. Starkville, MS: Mississippi State University.
2. Huff, J. D., Leonard, W., Stallcup, R., and Medal, H. (2017). *Using DoDAF attack scenarios to develop Attacker-Defender Bi-level Mixed Integer Programming Models: A Wireless Network Jamming Application*. Tech. rep. Starkville, MS: Mississippi State University.
3. Medal, H. and Schweitzer, D. (2017). *Computing the Vulnerability of Multi-Hop Wireless Networks: A Search for the Best Interference Model*. Tech. rep. Starkville, MS: Mississippi State University.
4. David Schweitzer and Medal, H. (2019a). *Detecting Varieties of Botnets Through Generalized Communication Behaviors*. Tech. rep. Knoxville, TN: University of Tennessee.
5. David Schweitzer and Medal, H. (2019b). *Maximum Network Lifetime Under the Threat of Denial-of-Sleep Attacks*. Tech. rep. Knoxville, TN: University of Tennessee.
6. Mike Sherwin, Medal, H., and C. Mackenzie (2019). *Predicting Supplier Reliability in a Low Volume High Value Supply Chain Using Machine Learning*. Tech. rep. Knoxville, TN: University of Tennessee.

Book chapters

1. Vadlamani, S., Medal, H., B. Eksioglu, and P. Li (2014b). "Security in Wireless Networks: An Operations Research Oriented Tutorial". In: ed. by S. Butenko, E. L. Pasilio, and V. Shylo. Vol. 37. NATO Science for Peace and Security. IOS Press, pp. 272–288.

Peer-reviewed conference papers

1. Medal, H., S. J. Gade, D. and Mason, R. D. Meller, and E. A. Pohl (2008). *Pickup and Delivery of Poultry in Rural Networks*. In: *2008 Industrial Engineering Research Conference*. Ed. by J. Fowler and S. Mason. Vancouver, Canada, pp.1897–1902 (CD).
2. Medal, H., M. D. Rossetti, Varghese, V.M., and E. A. Pohl (2009). *A Software Tool for Intermittent Demand Analysis*. In: *2009 Industrial Engineering Research Conference*. Ed. by J. C. Smith and J. Geunes. Miami, Florida, pp.1658–1663 (CD).
3. Li, X., Medal, H., and Wang, J. (2014). *A Network Design Model under Connectivity Constraints with Heterogeneous Services*. In: *Proceedings of the 2014 Transportation Research Board Conference*. Washington, D.C.
4. Vadlamani, S., Medal, H., B. Eksioglu, and P. Li (2014a). *A Bilevel Programming Model for the Wireless Network Jamming Placement Problem*. In: *2014 Industrial Engineering Research Conference*. Ed. by Y. Guan and H. Liao. Montreal, Canada.
5. Heier-Stamm, J., R. Burch, and Medal, H. (2015). *Students' Experiences with an Open-ended Client Project in a Graduate Course*. In: *proceedings of the 112nd ASEE Annual Conference and Exposition*. Seattle, WA.
6. Bhuiyan, T. H., Nandi, A. K., Medal, H., and M. Halappanavar (2016). *Minimizing Expected Maximum Risk from Cyber-Attacks with Probabilistic Attack Success*. In: *Accepted for publication in IEEE International Conference on Technologies for Homeland Security*. Waltham, Massachusetts, USA.
7. Hoskins, A. and Medal, H. (2016). *A Stochastic Programming Approach to Satellite Wildfire Observations*. In: *Proceedings of the Industrial and Systems Engineering Research Conference*. Anaheim, CA, United States.
8. Rashidi, E. and Medal, H. (2016). *Information diffusion in social networks with individual time constraints*. In: *Proceedings of the Industrial and Systems Engineering Research Conference*. Anaheim, CA, United States.
9. Schweitzer, D., Jafari, R., and Medal, H. (2016). *Analyzing the Vulnerability of a Single-Hop Wireless Network Grid*. In: *Proceedings of the Industrial and Systems Engineering Research Conference*. Anaheim, CA, United States.
10. Zhang, F., S. Zhang, P. C. Wong, Medal, H., L. Bian, Y. Wang, J. E. Swan, and T. J. Jankin-Kelly (2017). *A Visual Evaluation Study of Graph Sampling Techniques*. In: *IS&T International Symposium on Electronic Imaging*. Society for Imaging Science and Technology, pp.110–117.

Non-peer-reviewed conference papers

1. Nandi, A. K. and Medal, H. (2013b). *Link removal models for minimizing the spread of infections in a network*. In: *Proceedings of the 8th INFORMS Workshop on Data Mining and Health Informatics (DM-HI 2013)*. Ed. by O. Seref, N. Serban, and D. Zeng. INFORMS.

Theses and Dissertations

1. Medal, H. (2008a). "Multiobjective Simulation Optimization of Large-Scale Systems: A Comparison of Methods". MA thesis. Fayetteville, Arkansas: University of Arkansas.

¹Drafts nearly ready to submit to a journal.

2. **Medal, H.** (2012b). "Locating and Protecting Facilities Subject to Random Disruptions and Attacks". PhD thesis. Fayetteville, Arkansas: University of Arkansas.

Presentations

Invited conference presentations: abstract only

1. **Medal, H.** and E. A. Pohl (2007). "Multi-objective simulation optimization: a comparison of methods". INFORMS Annual Meeting. Seattle, WA.
2. **Medal, H.**, E. A. Pohl, and M. D. Rossetti (2010a). "The unreliable hub location problem". INFORMS Annual Meeting. Austin, TX.
3. **Medal, H.**, *Sharp, S.*, E. A. Pohl, and S. J. Mason (2010). "Models for protecting transportation networks". Industrial Engineering Research Conference (IERC). Cancun, Mexico.
4. **Medal, H.**, E. A. Pohl, and M. D. Rossetti (2011). "Locating and hardening facilities subject to failures". Industrial Engineering Research Conference (IERC). Reno, NV.
5. **Medal, H.**, *Wang, C.*, E. A. Pohl, C. E. Rainwater, and S. J. Mason (2011). "Pre-positioning supplies and hardening for disaster relief." Department of Homeland Security Student Day. Washington, D.C.
6. **Medal, H.** (2012a). "Geometric Interdiction of Multi-State Networks with Stochastic Interdiction Effect". INFORMS Annual Meeting. Phoenix, AZ.
7. **Medal, H.**, E. A. Pohl, and M. D. Rossetti (2012). "Imperfect Interdiction of Multi-State Facilities". INFORMS Annual Meeting. Phoenix, AZ.
8. **Medal, H.** (2013). "A Greedy Algorithm for Two-stage Stochastic Programs with Decision-Dependent Probabilities". INFORMS Annual Meeting. Minneapolis, MN.
9. **Medal, H.**, X. Li, *Parsafard, M.*, *Rashidi, E.*, and *Winters, M.* (2013). "Optimizing the Mobility and Safety of Walk-and-Ride Systems." INFORMS Annual Meeting. Minneapolis, MN.
10. **Medal, H.**, E. A. Pohl, and M. D. Rossetti (2013). "Imperfect Protection of Infrastructure Using Stochastic Programming with Endogenous Uncertainty". INFORMS Annual Meeting. Minneapolis, MN.
11. *Nandi, A. K.* and **Medal, H.** (2013d). "Optimization models to control infectious disease spread in networks". INFORMS Annual Meeting. Minneapolis, MN.
12. *Nandi, A. K.* and **Medal, H.** (2014a). "Optimal Allocation of Security Resources: Analyzing the Security-Efficiency-Cost Tradeoff". Industrial Engineering Research Conference (ISERC). Montreal, Canada.
13. *Rashidi, E.* and **Medal, H.** (2014). "Analyzing the Vulnerability of Landscapes to Pyro-terror attacks: A Network Interdiction Approach". INFORMS Annual Meeting. San Francisco, CA.
14. *Sherwin, M.*, S. Lapp, and **Medal, H.** (2014). "Risk Mitigation in a Supply Chain Infrastructure Using Fault-Tree Optimization". INFORMS Annual Meeting. San Francisco, CA.
15. *Vadlamani, Venkata S.*, B. Eksioglu, and **Medal, H.** (2014). "A Bi-Level Programming Model for the Wireless Network Jamming Placement Problem". INFORMS Annual Meeting. San Francisco, CA.

Invited conference presentations: with paper

1. Li, X. and **Medal, H.** (2013). "Infrastructure Network Design Under Additive Service Utilities". INFORMS Annual Meeting. Minneapolis, MN.
2. **Medal, H.**, *Vadlamani, S.*, and B. Eksioglu (2014). "The Wireless Network Jamming Problem Subject to Protocol Interference". Industrial Engineering Research Conference (ISERC). Montreal, Canada.

Contributed conference presentations: abstract only

1. **Medal, H.** (2008b). "The Java Simulation Library in designing and optimizing a supply-chain simulation model". INFORMS Annual Meeting. Washington, D.C.
2. **Medal, H.**, E. A. Pohl, and M. D. Rossetti (2009). "When should a firm donate excess inventory?" INFORMS Annual Meeting. San Diego, CA.
3. **Medal, H.**, E. A. Pohl, and M. D. Rossetti (2010b). "When should a nonprofit firm accept a donation?" Industrial Engineering Research Conference (IERC). Cancun, Mexico.
4. **Medal, H.**, C. E. Rainwater, E. A. Pohl, and M. D. Rossetti (2011). "Locating facilities subject to interdiction". INFORMS Computing Society Conference. Monterey, CA.
5. Li, X. and **Medal, H.** (2013). "Infrastructure Network Design Under Additive Service Utilities". INFORMS Annual Meeting. Minneapolis, MN.

6. Nandi, A. K. and Medal, H. (2013a). "Dynamic link suspension of an infectious disease network". Industrial Engineering Research Conference (ISERC). San Juan, Puerto Rico.
7. Nandi, A. K. and Medal, H. (2013e). "Optimization models to control infectious disease spread in networks". 8th INFORMS Workshop on Data Mining and Health Informatics. Minneapolis, MN.
8. Hoskins, A. and H. Medal (2015). "A Stochastic MILP Approach to Satellite Orbital Maneuvers to Collect Forest Fire Data". INFORMS Annual Meeting. Philadelphia, PA.
9. Nandi, A. and H. Medal (2015). "Bi-level Stochastic Network Interdiction Model for Deployment of Cyber-security Countermeasures". INFORMS Annual Meeting. Philadelphia, PA.
10. Poudel, S., L. Bian, M. Marufuzzaman, and H. Medal (2015). "Designing a Dynamic Multimodal Transportation Network under Biomass Supply Uncertainty". INFORMS Annual Meeting. Philadelphia, PA.
11. Rashidi, E. and H. Medal (2015). "A Network Interdiction Approach for Mitigating a Pyro-Terror Attack". INFORMS Annual Meeting. Philadelphia, PA.
12. Sherwin, M., S. Lapp, and H. Medal (2015). "Proactive Cost-effective Risk Mitigation in a Supply Chain using Fault-tree Analysis". INFORMS Annual Meeting. Philadelphia, PA.
13. Hoskins, A. B. and H. Medal (2016). "A Stochastic Programming Approach To Satellite Constellation Design". INFORMS Annual Meeting. Nashville, TN.
14. Medal, H. (2016). "Computing The Maximum Lifetime Flow Of A Network With Short Node Lifetimes". INFORMS Annual Meeting. Nashville, TN.
15. Rashidi, E. and H. Medal (2016). "Vulnerability Analysis of the Initial Attack in Suppressing the Worst Case Wildfires". INFORMS Annual Meeting. Nashville, TN.

Contributed conference presentations: with paper

1. Nandi, A. K. and Medal, H. (2013e). "Optimization models to control infectious disease spread in networks". 8th INFORMS Workshop on Data Mining and Health Informatics. Minneapolis, MN.

Funded Research Projects

Federal

1. Medal, H.R. (PI) and Li, X., Optimizing the mobility and safety of walk-and-ride systems. National Center for Intermodal Transportation and Economic Competitiveness (funded by US Department of Transportation). \$99,954 (\$55,036 Medal share) with \$102,988 cost share from Mississippi State University. 19.5 months + NCE (August 15, 2013–June 30, 2016). *Competition among center partners.*
2. Grala, R.K, Varner, J.M., Medal, H.R. (Co-PI), Munn, I.A., Grado, S.C., Cooke III, W.H., Benefits and costs of implementing fuel treatments on nonindustrial private forest (NIPF) lands in Mississippi. Joint Fire Science Program (Department of the Interior, Bureau of Land Management). \$218,000 (\$46,513 Medal share). 3 years (September 2013–September 2016). *Competitive.*
3. Medal, H.R. (PI), Gordon, J., Grala, R.K. Pyro-terrorism risk assessment and management: a pilot study. Department of Homeland Security via the National Center for Risk and Economic Analysis of Terrorism Events (CREATE). \$24,991 (\$24,991 Medal share). 1 year (July 1, 2014–June 30, 2015). *Competitive.*
4. Medal, H.R. (PI), Using high-performance computing to simulate the vulnerability of wireless communication networks to jamming attacks. Engineering Research Development Center (U.S. Army). \$106,310. 12 months (January 15, 2015– December 31, 2015). *No competition.*
5. Medal, H.R. (PI), Bian, L., Hu, M., Marufuzzaman, M., Zhang, S., Large-Scale graph analytics for cyber network vulnerability analysis. Pacific Northwest National Laboratory (via the Distributed Analytics and Security Institute). \$600,000, 12 months (May 16, 2015– May 15, 2016). *Competition among MSU researchers.*
6. Medal, H.R. (PI), Gordon, J., Grala, R.K. A gap analysis of wildland fire response resources in the United States. Department of Homeland Security via the National Center for Risk and Economic Analysis of Terrorism Events (CREATE). \$49,967 (\$45,311 Medal share). 1 year (July 1, 2015–June 30, 2016). *Competitive.*
7. Medal, H.R. (PI), WD62 (HPC-based Sensor Analytics) Task 5: Modeling and Simulation of Wireless Sensor Networks. United States Army Tank Automotive and Armaments Command. \$180,358. 12 months (January 14, 2016–January 13, 2017). *No competition.*
8. Medal, H.R. (PI), Bian, L., Zhang, S., Graph Simulation for Large-Scale NetFlow Analysis. Pacific Northwest National Laboratory. \$400,000 (\$200,000 Medal share), 12 months (March 16, 2016– March 15, 2017). *Competition among MSU researchers.*

- King, R., Jaradat, R. **Medal, H.R.** Walden, C., Systems Engineering Topic 4: Computational Prototyping and Proving Ground Environment. U.S. Army Corps of Engineers. \$2,432,550 (\$361,924 Medal share). 3 years (October 1, 2016–September 30, 2019). *No competition.*

Industry and Other

- Li, X., Breen, D., French, E., **Medal, H.R. (Co-PI)**, Mississippi transportation infrastructure Improvement opportunities, Hearin Foundation (through the Mississippi Economic Council). \$225,000, \$57,500 Medal share. 12 months (March 1, 2015– February 28, 2016). *No competition.*
- Bian, L., Marufuzzaman, Md., **Medal, H.R. (Co-PI)**, Project name confidential (contract). FedEx Express. \$107,156, 12 months (September 1, 2015– August 31, 2016). *No competition. Note: Medal withdrew from this project in 2016 due to other obligations.*

Projects Listed as Key Personnel

- Williams, B., Haupt, T., **Medal, H.R.**, Engineering resilient software architectures, methods, and infrastructure for HPC tradespace tools (Medal subproject: Parallel stochastic optimization algorithms for engineering robust systems under uncertainty). \$53,739 Medal share. 8 months (January 1, 2014– September 1, 2014). (sub-project of a larger grant from ERDC awarded to Roger King.) *No competition.*
- Advised a student in the “Problems in National Information Security” course, managed by Purdue University. This course was part of the INSuRE program, which was funded by the National Science Foundation. \$5,000 Medal share. Spring 2015.

Internal

- Medal, H.R.**, Li, X. Transportation working group. \$2,000. Bagley College of Engineering. 12 months (9/1/13–9/1/14).
- Medal, H.R.**, Grala, R.K, Varner, J.M., Gordon, J., Cooke III, W.H. \$4,000. Mitigating the effects of wildfires by efficiently allocating fuels treatment resources. Cross-College Collaboration Program, Office of Research and Economic Development, Mississippi State University. 24 months (9/1/13–9/1/15; renewed after 1 year).
- Warkentin, M., **Medal, H.R.**, Cybersecurity threat management optimization. \$2,000. Cross-College Collaboration Program, Office of Research and Economic Development, Mississippi State University. 12 months (9/1/13–9/1/14).
- Grala, R.K, Gordon, J., **Medal, H.R.**, \$2,500. Transboundary research in wildfire prevention. International Working Groups Program, International Institute, Mississippi State University. 12 months (9/1/15–9/1/16).
- Medal, H.R.**, \$2,000. Wireless Network Jamming Subject to Protocol Interference Using Directional Antennas. Undergraduate Research Program, Office of Research and Economic Development, Mississippi State University. 12 months (11/1/16–10/1/17).
- Medal, H.R.**, \$271. Using Mathematical Programming to Create Domino Artwork to Display in Local School. Mini-Grant Program, Center for Community-Engaged Learning, Mississippi State University. Spring 2018.

Teaching

- 6 different courses taught: 3 undergraduate and 3 graduate.
- Developed a new course at Mississippi State University, IE 8763: Stochastic Programming.
- Co-authored a study on students’ experiences with open-ended industry projects (Heier-Stamm, Burch, and **Medal, H.** (2015)).
- Nominated for 2017 Bagley College of Engineering Academy of Distinguished Teachers.
- Awarded 2017-8 Mini-Grant from Center for Community-Engaged Learning for project titled “Using Mathematical Programming to Create Domino Artwork to Display in Local School”.

Course climate scores for lecture-based courses

All courses 3 credit hours

Semester	Course No.	Course Name	Responses	Course Climate Score
Sp 2018	IE 4/6733	Linear Programming	59/	4.2/5
Fa 2017	IE 3913	Engineering Economy I	211/286	3.4/5
Fa 2017	IE 8753	Network Flows and Dyn. Progr.	6/7	4.6/5
Sp 2017	IE 4/6733	Linear Programming	59/67	4.3/5
Fa 2016	IE 8990	Stochastic Optimization	4/4	4.8/5
Fa 2016	IE 4/6333	Production Control I	31/38	4.3/5
Sp 2016	IE 4/6733	Linear Programming	43/55	4.1/5
Sp 2016	IE 8743	Nonlinear Programming	4/5	4.1/5
Fa 2015	IE 4/6333	Production Control I	35/38	3.8/5
Spr 2015	IE 3913	Engineering Economy I	139/221	3.8/5
Fa 2014	IE 8753	Network Flows and Dyn. Progr.	6/8	4.6/5
Spr 2014	IE 8990	Stochastic Optimization I	6/8	4.5/5
Fa 2013	IE 3913	Engineering Economy I	81/115	4.1/5
Spr 2013	IE 3913	Engineering Economy I	64/81	3.9/5
Fa 2012	IE 3913	Engineering Economy I	34/65	3.4/5

Table 1: Classroom teaching at Mississippi State University

Semester	Course No.	Course Name	Responses	Course Climate Score
Sp 2018	IE 6333	Linear Programming	5/	4.5/5
Fa 2017	IE 8753	Network Flows and Dyn. Progr.	7/10	4.6/5
Sp 2017	IE 6733	Linear Programming	3/4	3.9/5
Fa 2016	IE 4/6333	Production Control I	15/20	4.1/5
Sp 2016	IE 6333	Linear Programming	2/3	4.9/5
Sp 2016	IE 8743	Nonlinear Programming	4/4	3.6/5
Fa 2015	IE 6333	Production Control	9/15	3.7/5
Fa 2014	IE 8753	Network Flows and Dyn. Progr.	2/3	3.4/5
Sp 2014	IE 8990	Stochastic Optimization I	4/4	4.3/5

Table 2: Distance teaching at Mississippi State University (all courses concurrent with an on-campus course)

Sem.	Course Number	Course Name	Enroll.	Course Climate Score
Sp 2012	IE 3913	Methods and Standards	35	4.05/5
Fa 2011	OMGT 5463	Economic Decision-Making	12	4.54/5
Su 2009	INEG 3313	Engineering Statistics	19	3.6/5

Table 3: Classroom teaching at University of Arkansas (as a graduate student)

Directed Individual Study Courses

Simulation Modeling (undergraduate)	Summer 2017
Applying Computer Programming and Optimization to the Wireless Network Jamming Problem (undergraduate) [assistance from Johnathon Huff (Ph.D. student)]	Spring 2017
Supply Chain Risk Modeling (undergraduate) [assistance from Mike Sherwin (Ph.D. student)]	Spring 2016
Optimization and Computer Programming (undergraduate) [assistance from Aaron Hoskins (Ph.D. student)]	Spring 2016
The Bin Packing Problem (undergraduate)	Spring 2015
Problems in National Information Security (graduate; course managed by Purdue University)	Spring 2015

Mentoring of Teachers

I was the mentor of record for the following students while they served as instructors.

Linear Programming

Roy Jafari	Summer 2016/7
Eghbal Rashidi	Summer 2015
Apurba Nandi	Spring 2015

Mentoring and Advising

- Chaired and graduated 6 Ph.D. students, 2 MS students; also supervised one research associate.
- I currently supervise three PhD students.
- I was nominated for the Outstanding Graduate Student Mentor Award in 2014 and 2015.
- I enjoy doing research with undergraduate students and have supervised 12 of them during my career

Dissertation Chair*Past Students*

Satish Vadlamani	Models for wireless network jamming and eavesdropping (co-advised by Burak Eksioglu)	December 2015
Apurba Nandi	Network interdiction models and algorithms for information Security	December 2016
Eghbal Rashidi	Optimization models and algorithms for vulnerability analysis and mitigation planning of pyro-terrorism	Spring 2015
Aaron Hoskins	Stochastic optimization for satellite forest fire monitoring	May 2017
Johnathon Huff	A novel approach to critical infrastructure vulnerability analysis using system and human executable architecture (co-advised by Brian Smith)	May 2017
Mike Sherwin	Optimal supply chain risk reduction using fault trees and mixed-integer programming	August 2018

Current Students

Tanveer Hossain Bhuiyan	Stochastic programming with endogenous uncertainty	May 2019
David Schweitzer	Models and algorithms for wireless network security	Summer 2019
Steve Gauthier	topic undecided	May 2022

Dissertation Committee Member*Past Students*

Seungjae Shin	Effect of RFID Technology on Profitability, Productivity, and Efficiency in U.S. Retail Supply Chains	August 2013
Mohammad Sadekuzzaman Roni	A Hub Based Supply Chain Network Design Model for Biomass Co-firing in Coal Plants with Rail Transportation	December 2013
Reuben Burch	Tactile skills of working generations	May 2014
Mohammad Marufuzzaman	A Carbon Constrained Biofuel Supply Chain Network Design Under Uncertainty	June 2014
John Behrends	Flight delay mitigation through minimizing taxi time with gate assignments	December 2016
Adindu Emelogu	Advanced Manufacturing Feasibility Assessment: A Supply Chain Model Analysis Perspective	December 2016
Sushil Poudel	Model and Algorithms for a Reliable, Non-congested Biomass Supply Chain Network Problem	May 2017

Current Students

Elliot Salisbury	Topic undecided	May 2018
David Moulder	A Framework for Scheduling a Mixed Primary Care Clinic using Simulation	May 2018
Mohannad Kabli	Stochastic Programming	May 2018
Sudipta Chowdhury	Models and algorithms for drone routing and optimization	May 2019

Master's Students Advised

Rebecca Vander Linde	Optimal scheduling of maintenance and replacement for a package carrier (co-advised by Md. Marufuzzaman)	December 2016
Will Leonard	The wireless network design problem	May 2018
Molly Edwards	<i>non-thesis</i>	May 2016
Taylor Coole	<i>non-thesis</i>	May 2018

Master's Thesis Committee Member

Fang Zhou (Civil Engineering)	A parsimonious two-way shooting algorithm for connected automated traffic smotthing	August 2015
Ravi Kiran Akula	Botnet detection using graph-based clustering	May 2018

Postdoctoral Fellows and Research Associates

Ravi Sadasivuni, Research Associate II 2015–2017

Undergraduates Included in Research

1. Matthew Winters, 2013–2015, "Optimizing the mobility and safety of walk-and-ride systems"
2. Kennedy Brown, 2014–present, "Pyro-terrorism risk assessment and management: a pilot study"; "Productivity enhancement of transport bin packers", "Optimal supply chain risk reduction using fault trees and mixed-integer programming"
3. Max Moseley, 2014–present, "Pyro-terrorism risk assessment and management: a pilot study", "Optimal allocation of cost-share resources for mitigating the effects of wildland fire in Mississippi"
4. Will Leonard, 2014–2017, "Pyro-terrorism risk assessment and management: a pilot study", "Wireless Network Jamming Subject to Protocol Interference Using Directional Antennas"
5. Ryan Weitzel, 2014, "Investigating new uses of GPS data from handheld scanners at FedEx Express"
6. Chris Crosby, 2015, "Mississippi transportation infrastructure Improvement opportunities"
7. Tarang Bhandari, 2015, "Mississippi transportation infrastructure Improvement opportunities"
8. Chris Cullum, 2015–2016, "BLASTOFF: A Stochastic Program Approach to Satellite Orbital Maneuvers to Collect Forest Fire Data"
9. Kelsey Seiter, 2015–2016, "Pyro-terrorism risk assessment and management: a pilot study"
10. Ryan Stallcup, 2016–2017, "Wireless Network Jamming Subject to Protocol Interference Using Directional Antennas"
11. David Mentgen, 2017-present, "The wireless access point location problem"
12. Sam Miller, 2018–present, "Optimal supply chain risk reduction using fault trees and mixed-integer programming"

Undergraduate Academic Advising

Semester	Number of students advised
Fall 2017	23
Spring 2017	21
Fall 2016	~25
Spring 2016	~25
Fall 2015	~25
Spring 2015	~25
Fall 2014	~20
Spring 2014	~10
Fall 2013	~10

Student Honors and Achievements

- Apurba Nandi
- 2014 MSU Spirit of the State award winner
 - 2015 Department of Industrial and Systems Engineering Outstanding Graduate Student
 - 2016 Department of Industrial and Systems Engineering Best Student Paper Award
- Eghbal Rashidi
- 2015 INFORMS Judith Liebman award (for outstanding service to INFORMS student chapter)
- Johnathon Huff
- Received 2016 grant of \$2,000 from MSU Office of Research and Economic Development to fund an undergraduate research assistant
- Mike Sherwin
- Received 2015 grant of \$2,000 from MSU Office of Research and Economic Development to fund an undergraduate research assistant
 - 2016 Department of Industrial and Systems Engineering Outstanding Distance Graduate Student
- Kennedy Brown, Max Moseley,
Will Leonard, Ryan Weitzel, Chris
Cullum, Ryan Stallcup
- Received funding from Bagley Undergraduate Research Program

Professional Societies

- Institute of Industrial and Systems Engineers (IISE, formerly IIE), 2002–present
- Institute for Operations Research and the Management Sciences (INFORMS), 2005–present
- INFORMS Section for Public Programs, Service, and Needs, 2009–present
- American Society for Engineering Education (ASEE), 2012–present
- Engineering honor societies: Tau Beta Pi, Alpha Pi Mu

Professional Service

- Council member, Operations Research Division, Institute of Industrial and Systems Engineers, 2017–present
- Ad-hoc journal referee: *Canadian Journal of Forest Research* (2), *Computers and Operations Research* (3), *Computers and Security*, *Decision Sciences*, *European Journal of Operational Research* (3), *Forest Ecology*, *IISE Transactions*, *INFORMS Journal on Computing*, *International Journal of Wildland Fire* (2), *Journal of Global Optimization* (2), *Networks* (2), *OMEGA*, *Optimization Letters*, *PLOS ONE*, *Transport Policy*, *Transportation Research Part E*, *Reliability and System Safety*
- Ad-hoc conference proceedings referee: Industrial and Systems Engineering Research Conference (ISERC, formerly IERC), IEEE Homeland Security Technology Conference (2014), International Conference on Information Systems for Crisis Response and Management (2014), Winter Simulation Conference
- Proposal referee: Great Plains Transportation Institute, North Dakota State University; Southeastern Transportation Research, Innovation, Development and Education Center (STRIDE), University of Florida
- Research project final report referee: STRIDE Center, University of Florida
- Competition judge: Public Sector OR (formerly SPPSN) Doing Good with Good OR Competition, 2014

- Session chair: ISERC, INFORMS
- Panelist, "Work/Life Balance", INFORMS Doctoral Colloquium, 2017
- Chair, INFORMS Doctoral Colloquium, 2019

Internal Service

Department Standing Committees

Graduate Program Committee	2014-5
Manufacturing/Production Committee	2014-5
Undergraduate Program Committee	2013-present
Operations Research and Statistics Committee	2012-present (chair, 2016-)
Library Committee	2012- (chair, 2014-)

Departmental Ad Hoc Committees

Faculty Search Committee	2014/15, 2016/17
Faculty Search Committee (Chair)	2017/18
Master's (Non-Thesis) Oral Comprehensive Examination Committee	2014, 2015
Distance Committee	2013
Curriculum Committee (subcommittee of Undergraduate Program Committee)	2012-13
Faculty Search Rubric Committee	2012
Master's (Non-Thesis) Comprehensive Exam Committee	Spring 2013, Spring 2015, Spring 2016
Prepared Question for Master's (Non-Thesis) Comprehensive Exam	Fall 2012, Spring 2014, Spring 2015, Fall 2015, Fall 2016

Service to College and Other Departments

Electrical Engineering Master's (Non-Thesis) Comprehensive Exam committee member	Spring 2016, Fall 2016
Bagley College Course and Curriculum Review Committee	2013-4

Outreach and Public Service

- Presented research to City of Starkille Transportation Committee, September 2013
- Taught module in A.P. Calculus class at Starkville High School on game theory, May 2014
- Organized ISE portion of E-Day (high school recruitment event), Spring 2015

Honors and Awards

- Article titled "Allocating Protection Resources to Facilities When the Effect of Protection is Uncertain" was one of two featured in the Research Highlights section of the February 2016 edition of IISE Magazine.