

# Hugh R Medal

PhD

Curriculum Vitae

September 2024

Department of Industrial and Systems Engineering,  
University of Tennessee, Knoxville, Tennessee

hughmedal.com

865-974-7647

hmedal@utk.edu

hmedal

## Education and qualifications

2006	B.Sc.(Hons)	Industrial Engineering	North Dakota State University
2008	M.S.	Industrial Engineering	University of Arkansas
2012	Ph.D.	Industrial Engineering	University of Arkansas

## Employment history

2018–	<b>Assistant Professor</b> , Department of Industrial & Systems Engineering, University of Tennessee
2012–2018	<b>Assistant Professor</b> , Department of Industrial & Systems Engineering, Mississippi State University

## Awards and honors

2018	Article selected as Best Application Paper in the IISE Transactions Focus Issue
2016	Article featured in Research Highlights section of IISE Magazine

## Grants

Recent external research grants are listed below.

2020–2021	Medal, H.R.. "STIR: Scalable Computation of Sublevel Sets of Nonconvex Functions Using Approximate Convex Envelopes". <i>Funding from Army Research Office</i>	\$47,418
2020–2022	Truster, T., Medal, H.R.. "Data Science Supplement for CAREER: Predictive Fatigue Behavior of Structural Materials Through Computationally-Informed Textural and Microstructural Influences". <i>Funding from National Science Foundation</i>	\$68,958
2022–2024	Medal, H.R. and Sherwin, M.. "Artificial Intelligence Models for Predicting Supply Chain Failures and Their Impact". <i>Funding from Naval Underwater Warfare Center (Keyport) via the NEEC program</i>	\$220,000
2023–2023	Medal, H.R.. "Supply Chain Obsolescence Strategy Development". <i>Funding from Consolidated Nuclear Security (Medal appointed as PI after death of R. Sawhney)</i>	\$125,000
2023–2024	Medal, H.R.. "Supply Chain Obsolescence Strategy Development". <i>Funding from Consolidated Nuclear Security</i>	\$273,000
2023–2025	Li, X. and H.R. Medal and Heaslip, K. and Xu, H. and Omitamouo, O. and Liu, Z.. "A Cognitive Freight Transportation Digital Twin for Resilience and Emission Control through Optimizing Intermodal Logistics (RECOIL)". <i>Funding from ARPA-E</i>	\$1,900,000

## Refereed research papers

1. Medal, H., Sharp, S., Pohl, E, Mason, SJ, & Rainwater, C. (2011). Models for reducing the risk of critical networked infrastructures. *International Journal of Risk Assessment and Management*, 15(2/3), 99–127.
2. Hernandez, I., Ramirez-Marquez, JE, Rainwater, C, Pohl, E, & Medal, H. (2014). Robust facility location: Hedging against failures. *Reliability Engineering and System Safety*, 123, 73–80.
3. Medal, H., Pohl, EA, & Rossetti, MD. (2014). A multi-objective integrated facility Location-Hardening model: Analyzing the pre- and Post-Disruption tradeoff. *European Journal of Operational Research*, 237, 257–270.
4. Medal, H., Rainwater, C, Pohl, E, & Rossetti, M. (2014). A bi-objective analysis of the R-All-neighbor P-Center problem. *Computers and Industrial Engineering*, 72, 114–128.
5. Gedik, R., Medal, H., Rainwater, C, Pohl, E, & Mason, S. (2014). Vulnerability assessment and re-routing of freight trains under disruptions: A coal supply chain network application. *Transportation Research Part E*, 71, 45–57.
6. Medal, H. (2016). The wireless network jamming problem subject to protocol interference. *Networks*, 67(2), 111–125.
7. Medal, H., Pohl, E, & Rossetti, M. (2016). Allocating protection resources to facilities when the effect of protection is uncertain. *IIE Transactions*, 48(3), 220–234.
8. Nandi, A. K., & 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., & Vadlamani, S. (2016). 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., & Li, X. (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., & Lapp, S. (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., Eksioglu, B., Medal, H., & 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., Zhang, S., Medal, H., Marufuzzaman, M., & Bian, L. (2017). Botnet detection using graph-based feature clustering. *Journal of Big Data*, 4(14).
14. Hoskins, A., Medal, H., & Rashidi, E. (2017). Satellite constellation design for forest fire monitoring via a stochastic programming approach. *Naval Research Logistics*, 64(8), 642–661.
15. Rashidi, E., Medal, H., Gordon, J., Grala, R., & Varner, M. (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., & Medal, H. (2017). Analyzing the vulnerability of an array of wireless access points. *Computers and Industrial Engineering*, 107, 25–38.
17. Rashidi, E., Hoskins, A., & Medal, H. (2018). Mitigating a pyro-terror attack using fuel management. *IIEE Transactions*, 50(6), 499–511.
18. Rashidi, E., Medal, H., & Hoskins, A. (2018). An attacker-defender model for analyzing the vulnerability of initial attack in wildfire suppression. *Naval Research Logistics*, 65(2), 120–134.
19. Vadlamani, S., Medal, H., Eksioglu, B., & Nandi, A. K. (2018). A mixed-integer programming approach for optimizing flow jamming attacks. *Computers and Operations Research*, 95, 83–96.
20. Bhuiyan, T. H., Moseley, M., Medal, H., Rashidi, E., & Grala, RK. (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.
21. David Schweitzer, & Medal, H. (2019). Wireless LAN transmitter location under the threat of jamming attacks. *Computers and Operations Research*, 106, 14–27.
22. Hoskins, A., & Medal, H. (2019). Stochastic programming solution for placement of satellite ground stations. *Annals of Operations Research*, 1–22.
23. Huff, J. D., Medal, H., & Griendling, KA. (2019). A Model-Based systems engineering approach to critical infrastructure vulnerability assessment and decision analysis. *Systems Engineering*, 22(2), 114–133.
24. Huff, J, Leonard, WB, Smith, BK, Griendling, K, & Medal, H. (2019). NATO human view executable architectures for critical infrastructure analysis. *Engineering Management Journal*, 31(4), 224–245.
25. Li, X, Medal, H., & Qu, X. (2019). Connected infrastructure network design under additive service utilities. *Transportation Research Part B*, 120, 99–124.
26. Bhuiyan, TH, Medal, HR, & Harun, S. (2020). A stochastic programming model with endogenous and exogenous uncertainty for reliable network design under random disruption. *European Journal of Operational Research*, 285(2), 670–694.
27. Mike Sherwin, Medal, H., Mackenzie, C, & Kennedy J. Brown. (2020). An optimized resource allocation approach to identify and mitigate supply chain risks using fault-tree analysis. *IIEE Transactions*, 52(2), 236–254.
28. Bhuiyan, TH, Medal, HR, Nandi, AK, & Halappanavar, M. (2021). Risk-averse bi-level stochastic network interdiction model for cyber-security risk management. *International Journal of Critical Infrastructure Protection*, 32, 100408.
29. Hayakawa, S, Isaacs, J, Medal, HR, & Xu, H. (2021). Atomistic modeling of meso-timescale processes with SEAKMC: A perspective and recent developments. *Computational Materials Science*, 194, 110390.
30. Rui Zhou, Bhuiyan, Tanveer Hossain, Michael Sherwin, & Medal, H. (2021). A stochastic programming model with endogenous uncertainty for proactive supplier risk mitigation of low-volume-high-value manufacturers considering decision-dependent supplier performance. *OMEGA*.
31. Tang, N, Quigley, L, Boldman, WL, Jorgensen, CS, Koch, R, O'Leary, D, Medal, HR, Rack, PD, & Gilbert, DA. (2021). Magnetism in metastable and annealed compositionally complex alloys. *Phys. Rev. Mater.*, 5, 114405.
32. Hoskins, AB, Medal, HR, & Rashidi, E. (2022). Optimization of twice-daily direct flyover data collection for satellite observations at uncertain locations. *Advances in Space Research*, 70(4), 1013–1031.

33. Huff, JD, Leonard, WB, & Medal, HR. (2022). The wireless network jamming problem subject to protocol interference using directional antennas and with battery capacity constraints. *International Journal of Critical Infrastructure Protection*, 39, 100572.
34. Ahanor, I, Medal, H, & Trapp, AC. (2023). DiversiTree: A new method to efficiently compute diverse sets of near-optimal solutions to mixed-integer optimization problems. *INFORMS Journal on Computing*.

### Book chapters

1. Vadlamani, S., Medal, H., Eksioglu, B, & Li, P. (2014). *Security in wireless networks: An operations research oriented tutorial* (S Butenko, EL Pasilio, & V Shylo, Eds.; Vol. 37, pp. 272–288). IOS Press.

### Papers in refereed conference proceedings

1. Medal, H., Mason, SJ Gade, D.and, Meller, RD, & Pohl, EA. (2008). Pickup and delivery of poultry in rural networks. In J Fowler & S Mason (Eds.), *2008 industrial engineering research conference* (pp. 1897–1902 (CD)).
2. Medal, H., Rossetti, MD, Varghese, V.M., & Pohl, EA. (2009). A software tool for intermittent demand analysis. In JC Smith & J Geunes (Eds.), *2009 industrial engineering research conference* (pp. 1658–1663 (CD)).
3. Nandi, A. K., & Medal, H. (2013). Link removal models for minimizing the spread of infections in a network. In O Seref, N Serban, & D Zeng (Eds.), *Proceedings of the 8th INFORMS workshop on data mining and health informatics (DM-HI 2013)*. INFORMS.
4. Li, X, Medal, H., & Wang, J. (2014, January). A network design model under connectivity constraints with heterogeneous services. *Proceedings of the 2014 Transportation Research Board Conference*.
5. Vadlamani, S., Medal, H., Eksioglu, B, & Li, P. (2014). A bilevel programming model for the wireless network jamming placement problem. In Y Guan & H Liao (Eds.), *2014 industrial engineering research conference*.
6. Heier-Stamm, J, Burch, R, & Medal, H. (2015). Students' experiences with an open-ended client project in a graduate course. *Proceedings of the 112nd ASEE Annual Conference and Exposition*.
7. Bhuiyan, T. H., Nandi, A. K., Medal, H., & Halappanavar, M. (2016). Minimizing expected maximum risk from Cyber-Attacks with probabilistic attack success. *IEEE International Conference on Technologies for Homeland Security*.
8. Hoskins, A., & Medal, H. (2016). A stochastic programming approach to satellite wildfire observations. *Proceedings of the Industrial and Systems Engineering Research Conference*.
9. Rashidi, E., & Medal, H. (2016). Information diffusion in social networks with individual time constraints. *Proceedings of the Industrial and Systems Engineering Research Conference*.
10. Schweitzer, D., Jafari, R., & Medal, H. (2016). Analyzing the vulnerability of a Single-Hop wireless network grid. *Proceedings of the Industrial and Systems Engineering Research Conference*.
11. Harun, S, Bhuiyan, TH, Zhang, S, Medal, H, & Bian, L. (2017). Bot classification for real-life highly class-imbalanced dataset. *2017 IEEE 15th Intl Conf on Dependable, Autonomic and Secure Computing, 15th Intl Conf on Pervasive Intelligence and Computing, 3rd Intl Conf on Big Data Intelligence and Computing and Cyber Science and Technology Congress (DASC/PiCom/DataCom/CyberSciTech)*, 565–572.
12. Zhang, F., Zhang, S, Wong, PC, Medal, H., Bian, L, Wang, Y, Swan, JE, & Jankin-Kelly, TJ. (2017). A visual evaluation study of graph sampling techniques. *IS&T International Symposium on Electronic Imaging*, 110–117.
13. Jenkins, L, Bhuiyan, T, Harun, S, Lightsey, C, Mentgen, D, Aksoy, S, Stavcnger, T, Zalewski, M, Medal, H, & Joslyn, C. (2018). Chapel hypergraph library (chgl). *2018 IEEE High Performance Extreme Computing Conference (HPEC)*, 1–6.
14. Bhuiyan, TH, Halappanavar, M, Friese, RD, Medal, H, De La Torre, L, Sathanur, A, & Tallent, NR. (2019). Stochastic programming approach for resource selection under demand uncertainty. *Job Scheduling Strategies for Parallel Processing: 22nd International Workshop, JSSPP 2018, Vancouver, BC, Canada, May 25, 2018, Revised Selected Papers 22*, 107–126.
15. Jaiyeola, MO, Young, M, Xiao, J, Medal, H, Grimes, G, & Schweitzer, D. (2019). Towards scalable planning of wireless networks. *2019 IFIP/IEEE Symposium on Integrated Network and Service Management (IM)*, 629–633.
16. Walton, N, Armstrong, J, Medal, H, & Sobes, V. (2023). Automated resonance evaluation; non-convex decomposition method for resonance regression and uncertainty quantification. *EPJ Web of Conferences*, 284.

### Journal Articles Submitted

1. Medal, H, & Ahanor, I. (2022). A spatial branch-and-bound approach for maximization of non-factorable monotone continuous submodular functions. *Submitted to Journal of Global Optimization (Status: Under Second-Round Review)*.

2. Affar, S, & Medal, H. (2024). A successive refinement algorithm for tri-level stochastic defender-attacker problems with decision-dependent probability distributions. *Submitted to INFORMS Journal on Computing (Status: Under Review)*.
3. Affar, S, Medal, H, Camur, C, & Li, X. (2024). Robust driver assignment in shared truckload transportation. *Submitted to Transportation Research Record (Status: Under Review)*.
4. Medal, H, & Affar, S. (2024). A successive refinement algorithm for solving stochastic programs with decision-dependent random capacities. *Submitted to Mathematical Programming (Status: Rejected); Will Submit to Another Journal*.
5. Sherwin, M, Medal, H, & MacKenzie, C. (2024). An empirical approach to predicting supplier performance and selecting suppliers in a critical supply chain. *Submitted to International Journal of Management Science and Engineering Management (Status: Under Review)*.

## Teaching

- Undergraduate courses taught: IE 301, IE 402
- Graduate courses taught: IE 522, IE 602, IE 604, IE 609

## Student Advising

### Past

- Ph.D. Students Advised: Tanveer Bhuiyan (2019), Izuwa Ahanor (2023)
- Capstone advisor for ISE Cohort program, Spring 2024
- Undergraduate researchers advised: Jade Triebel, Jack Krimmel, Seth Shucat, Harriet Williamson, Hannah Selph, Adam Riley
- Assisted several senior design teams

### Current

- Current Ph.D. students advising: Samuel Affar, Chad Uhles, Dhiraj Pokhrel, Jiaqi Jiang
- Current undergraduate researchers: Jessie Wilson, Samuel Crawford

## Service and Outreach

### External

- Grant proposal reviewer, National Science Foundation, Operations Engineering program
- Grant proposal reviewer, Department of Energy, Advanced Scientific Computing Research program (various calls)
- Journal referee, Various journals including Operations Research, Mathematical Programming, and INFORMS Journal on Computing
- Associate Editor, Networks, 2019 to present
- Member of Parts and Material Management Working Group, Office of Secretary of Defense, 2023 to present
- Member of National Academy of Science's Standing Committee on Defense Materials, Manufacturing, and its Infrastructure.
- Cluster Chair, INFORMS Computing Society Conference, 2019
- Co-chair of 2019 AFOSR-sponsored workshop titled "Configurational complex materials research"
- Board member, Operations Research Division, Institute of Industrial and Systems Engineers, 2017 to 2018
- Chair of INFORMS Doctoral Student Colloquium, 2019 and 2020

### Department, College, University

- ISE Faculty search committee, 2018-19, 2022-23, 2023-24
- ISE Computing thread committee, 2022-23
- ISE graduate admissions committee, 2022-24
- Tickle College of Engineering service awards committee, 2019-2023
- Mentor for the UTK HITES12 Summer Program for rising high-school seniors