

Chase C. Murray

Associate Professor
Department of Industrial & Systems Engineering
University at Buffalo

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EDUCATION

- Ph.D., Industrial & Systems Engineering,
University at Buffalo, The State University of New York, Buffalo, New York, 2010.
- M.E., Industrial Engineering,
Texas A&M University, College Station, Texas, 2000.
- B.S., Industrial Engineering,
Texas A&M University, College Station, Texas, 1998.

RESEARCH INTERESTS

Optimization of complex systems, generally requiring the development of heuristics to solve combinatorial problems. Of particular interest are systems involving unmanned aircraft systems (UAS, or drones); including drone-assisted last-mile delivery, drone autonomy, and UAV/UGV coordination.

Previous research interests include vehicle platoons, facility layout, shelf space optimization, and product pricing.

EMPLOYMENT HISTORY

- University at Buffalo – Associate Professor, Industrial & Systems Engineering.
Buffalo, NY. 2022 – present.
- University at Buffalo – Assistant Professor, Industrial & Systems Engineering.
Buffalo, NY. 2015 – 2022.
- Auburn University – Assistant Professor, Industrial & Systems Engineering.
Auburn, AL. 2010 – 2015.
- University at Buffalo – Research Assistant. Buffalo, NY. 2007 – 2010.
- University at Buffalo – Teaching Assistant/Instructor. Buffalo, NY. 2005 – 2007.
- Intel Corporation – Industrial Engineer. Hillsboro, OR. 2001 – 2005.
- Dallas Semiconductor – Industrial Engineer. Dallas, TX. 2000 – 2001.

PEER-REVIEWED PUBLICATIONS

*– Ph.D. student author from University at Buffalo;

†– Student author from Auburn University;

◁– Murray is corresponding author;

◇– Author was Ph.D. advisor;

+– Paper was written prior to UB;

Citation counts, h-index, and i10-index from Google Scholar, 1/17/2025:

Total Citations: 3839

h-index: 20

i10-index: 25

Published and Accepted:

27. Z. Steever^{*}, K. Hunt, M. Karwan, J. Yuan, **C. Murray** (2024), “A Graph-Based Approach for Relating Integer Programs.” *INFORMS Journal on Computing*, <https://doi.org/10.1287/ijoc.2023.0255>.
26. R. Raj, M.H. Karwan, **C. Murray**, L. Sun (2023), “A numerical optimization approach for pricing components in customer defined bundles in a B2B market.” *Computers & Operations Research*, 155, 106215. <https://doi.org/10.1016/j.cor.2023.106215>. 1 citation.
25. L. Pan^{*}, **C. Murray** (2022), “VeRoViz: A Vehicle Routing Visualization Toolkit.” *INFORMS Journal on Computing*, 34 (4), 1842-1848. <https://doi.org/10.1287/ijoc.2022.1159>. 10 citations.
24. Z. Steever^{*}, **C. Murray**, J. Yuan, M. Karwan, M. Lübbecke (2022), “An Image-based Approach to Detecting Structural Similarity Among Mixed Integer Programs.” *INFORMS Journal on Computing*, 34 (4), 1849-1870. <https://doi.org/10.1287/ijoc.2021.1117>. 6 citations.
23. R. Raj^{*}, M. Karwan, **C. Murray**, L. Sun (2022), “Itemized Pricing in B2B Bundles with Diminishing Reservation Prices and Loss Averse Customers.” *Journal of Revenue and Pricing Management*, 21, 375–392. <https://doi.org/10.1057/s41272-021-00341-y>. 2 citations.
22. Y. Khayati, J. Kang, M. Karwan, **C. Murray** (2021), “Household Activity Pattern Problem with Autonomous Vehicles.” *Networks and Spatial Economics*, 21, 609–637. <https://doi.org/10.1007/s11067-021-09537-6>. 6 citations.
21. Y. Khayati, J. Kang, M. Karwan, **C. Murray** (2021), “Household Use of Autonomous Vehicles with Ride Sourcing.” *Transportation Research Part C: Emerging Technologies*, 125, 102998. <https://doi.org/10.1016/j.trc.2021.102998>. 12 citations.
20. R. Raj^{*}, **C. Murray** (2020), “The multiple flying sidekicks traveling salesman problem with variable drone speeds”. *Transportation Research Part C: Emerging Technologies*, 120, 102813. <https://doi.org/10.1016/j.trc.2020.102813>. 101 citations.
19. M. Worden^{*}, **C. Murray**, M. Karwan, R. Nagi, H.J. Ortiz-Peña (2020), “Sensor Tasking for Unmanned Aerial Vehicles in Disaster Management Missions with Limited Communications Bandwidth”. *Computers & Industrial Engineering*, 149, 106754. <https://doi.org/10.1016/j.cie.2020.106754>. 3 citations.
18. **C. Murray**[∧], R. Raj^{*} (2020), “The multiple flying sidekicks traveling salesman problem: Parcel delivery with multiple drones.” *Transportation Research Part C: Emerging Technologies*, 110, 368–398. <https://doi.org/10.1016/j.trc.2019.11.003>. 385 citations.
17. Z. Steever^{*∧}, M. Karwan, **C. Murray** (2019), “Dynamic Courier Routing for a Food Delivery Service.” *Computers and Operations Research*, 107, 173–188. <https://doi.org/10.1016/j.cor.2019.03.008>. 104 citations.
16. M. Gulsen, **C. Murray**, A.E. Smith (2019), “Double-row Facility Layout with Replicate Machines and Split Flows.” *Computers and Operations Research*, 108, 20–32. <https://doi.org/10.1016/j.cor.2019.03.009>. 26 citations.
15. H.-Y. Lee[†], **C. Murray**[∧] (2019), “Robotics in Order Picking: Evaluating Warehouse Layouts for Pick, Place, and Transport Vehicle Routing Systems.” *International Journal of Production Research*, 57 (18), 5821–5841. <https://doi.org/10.1080/00207543.2018.1552031>. 86 citations.
14. J. Wang, A.K.R. Jagannathan[†], X.Q. Zuo, **C. Murray** (2017), “Two-layer Simulated Annealing and Tabu Search Heuristics for a Vehicle Routing Problem with Cross Docks

- and Split Deliveries.” *Computers & Industrial Engineering*, 112, 84–98. <https://doi.org/10.1016/j.cie.2017.07.031>. 63 citations.
13. N. Al Theeb[†], **C. Murray**[◄] (2017), “Vehicle Routing and Resource Distribution in Post-disaster Humanitarian Relief Operations.” *International Transactions in Operational Research*, 24 (6), 1253–1284. <http://dx.doi.org/10.1111/itor.12308>. 81 citations.
 12. X.Q. Zuo, **C. Murray**, A.E. Smith (2016), “The Double-bay Layout Problem.” *IEEE Transactions on Semiconductor Manufacturing*, 29 (4), 446–454. <https://doi.org/10.1109/TSM.2016.2603443>. 6 citations.
 11. X.Q. Zuo, **C. Murray**, A.E. Smith (2016), “Sharing Clearances to Improve Machine Layout.” *International Journal of Production Research*, 54 (14), 4272–4285. <http://dx.doi.org/10.1080/00207543.2016.1142134>. 34 citations.
 - 10.⁺ D. Bevly, X. Cao, M. Gordon, G. Ozbilgin, D. Kari, B. Nelson, J. Woodruff[†], M. Barth, **C. Murray**, A. Kurt, K. Redmill, U. Ozguner (2016) “Lane Change and Merge Maneuvers for Connected and Automated Vehicles: A Survey.” *IEEE Transactions on Intelligent Vehicles*, 1 (1), 105–120. <http://dx.doi.org/10.1109/TIV.2015.2503342>. 265 citations.
 - 9.⁺ **C. Murray**[◄], A.G. Chu[†] (2015), “The Flying Sidekick Traveling Salesman Problem: Optimization of Drone-assisted Parcel Delivery.” *Transportation Research Part C: Emerging Technologies*, 54, 86–109. <http://dx.doi.org/10.1016/j.trc.2015.03.005>. 1378 citations.
 - 8.⁺ X.Q. Zuo, **C. Murray**, A.E. Smith (2014), “Solving an Extended Double Row Layout Problem using Multi-objective Tabu Search and Linear Programming.” *IEEE Transactions on Automation Science and Engineering*, 11 (4), 1122–1132. dx.doi.org/10.1109/TASE.2014.2304471. 79 citations.
 - 7.⁺ **C. Murray**[◄], A.E. Smith, Z. Zhang (2013), “An Efficient Local Search Heuristic for the Double Row Layout Problem with Asymmetric Material Flow.” *International Journal of Production Research*, 51 (20), 6129–6139. dx.doi.org/10.1080/00207543.2013.803168. 46 citations.
 - 6.⁺ **C. Murray**[◄], W. Park (2013), “Incorporating Human Factors Considerations in Unmanned Aerial Vehicle Routing.” *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 43 (4), 860–874. dx.doi.org/10.1109/TSMCA.2012.2216871. 57 citations.
 - 5.⁺ **C. Murray**[◄], M.H. Karwan[◊] (2013), “A Branch-and-Bound-Based Solution Approach for Dynamic Rerouting of Airborne Platforms.” *Naval Research Logistics*, 60 (2), 141–159. dx.doi.org/10.1002/nav.21526. 17 citations.
 - 4.⁺ **C. Murray**[◄], A. Gosavi, D. Talukdar (2012), “The Multi-Product Price-Setting Newsvendor with Resource Capacity Constraints.” *International Journal of Production Economics*, 138, 148–158. dx.doi.org/10.1016/j.ijpe.2012.03.014. 51 citations.
 - 3.⁺ Z. Zhang and **C. Murray**[◄] (2012), “A Corrected Formulation for the Double Row Layout Problem,” *International Journal of Production Research*, 66 (15), 4220–4223. dx.doi.org/10.1080/00207543.2011.603371. 72 citations.
 - 2.⁺ **C. Murray**[◄], M.H. Karwan[◊] (2010), “An Extensible Modeling Framework for Dynamic Reassignment and Rerouting in Cooperative Airborne Operations.” *Naval Research Logistics*, 57 (7), 634–652. dx.doi.org/10.1002/nav.20427. 56 citations.
 - 1.⁺ **C. Murray**[◄], D. Talukdar, A. Gosavi (2010), “Joint Optimization of Product Price, Display Orientation and Shelf-Space Allocation in Retail Category Management,” *Journal of Retailing*, 86 (2), 125–136. dx.doi.org/10.1016/j.jretai.2010.02.008. 173 citations.

Refereed Conference Proceedings:

2. M. Yu, X.Q. Zuo, **C. Murray** (2014), “A Tabu Search Heuristic for the Single Row Layout Problem with Shared Clearances.” *2014 IEEE Congress on Evolutionary Computation (CEC)*, 819–825, July 6–11, 2014. [dx.doi.org/10.1109/CEC.2014.6900353](https://doi.org/10.1109/CEC.2014.6900353)
1. **C. Murray**, X. Zuo, A.E. Smith, “An Extended Double Row Layout Problem.” 12th International Material Handling Research Colloquium (IMHRC), Gardanne, France. Appears in *Progress in Material Handling Research: 2012*, edited by B. Montreuil, A. Carrano, M.M.R. de Kostner, K.R. Gue, M. Ogle, and J. Smith, Material Handling Institute, 554–569.

Working Papers:

7. L. Pan*, **C. Murray**, “Parallel Drone Scheduling Traveling Salesman Problem with Weather Impacts.” Available at <https://dx.doi.org/10.2139/ssrn.4254262>.
6. R. Raj*, D. Lee*, S. Lee, J. Walteros, **C. Murray**, “A branch-and-price approach for the parallel drone scheduling vehicle routing problem.” Available at <https://dx.doi.org/10.2139/ssrn.3879710>.
5. R. Raj*, **C. Murray**, “The Time-Dependent Multiple Flying Sidekicks Traveling Salesman Problem: Parcel Delivery with Traffic Congestion.” Available at <https://dx.doi.org/10.2139/ssrn.3767870>.
4. A. Kopanon*, **C. Murray**, “Optimal Drone Routing for Facade Inspections.”
3. D. Lee*, C. Nebelecky, J. Crassidis, M. Sudit, **C. Murray**, “Multi-Objective Vehicle Route Planning with Satellite Communications and Uplink Signal Detection.”
2. D. Lee*, C. Nebelecky, J. Dening, J. Crassidis, M. Sudit, **C. Murray**, “Scheduling Lunar Satellite Communications with Risk of Data Interception.”
1. K. Hunt, T. Schroth*, A. DeHollander, **C. Murray**, “Relating Integer Programs: An Experimental Study on the State-of-the-Art.”

FUNDING

Awarded, University at Buffalo (\$1,616,257 of \$7,283,416):

13. “Coordinated Drone Swarms for Defense and Entertainment Applications,” University at Buffalo Research and Economic Development Equipment Program, PI: C. Murray (100%), \$137,100, 1/13/25 - 12/31/25.
12. “Real-Time Reconfigurable Intelligence-based Patrol Strategies (RTRIPS): An Optimization Toolkit for Border Security,” US Department of Homeland Security (pass-through via Arizona State University), PI: J. Zhuang (70%), Co-PI: C. Murray (30%), \$750,000, 7/1/24 - 6/30/27.
11. “Research Experimentation for Space and Counter-UxVs Engagement (RESCUE)“, US Air Force Office of Scientific Research (AFOSR), PI: J. Crassidis (34%), co-PI: C. Murray (33%), co-PI: M. Sudit (33%) \$234,633, 2/1/24 - 1/31/25.
10. “Providing Alternate Season Schedules (PASS), Phase 2,” National Football League (NFL), PI: M. Karwan (50%), co-PI: C. Murray (50%), \$298,945, 1/1/21 - 9/30/2024.
9. “Systematic Autonomy Vehicle Equation Recovery (SAVER),” Defense Advanced Research Projects Agency (DARPA, through CUBRC, Inc.), PI: C. Murray (50%); Co-PI: M. Sudit (50%), \$338,868, 12/1/20 - 5/31/22.
8. “Rehabilitation Engineering Research Center on Physical Access and Transportation,” National Institute on Disability, Independent Living, and Rehabilitation Research, PI: J. Maisel; C. Murray (10%), \$4,624,975, 10/1/20 - 9/30/25.

7. "Electric Vehicle Routing," Stephen Still, PI: C. Murray (100%), \$14,999, 6/1/20 - 8/31/20.
6. "Pricing Model Development," ACV Auctions, Inc, PI: C. Murray (100%), \$17,127, 6/1/20 - 8/31/20.
5. "Graphical View of Available Inventory," ACV Auctions, Inc, PI: C. Murray (100%), \$58,023, 1/27/20 - 8/26/20.
4. "Providing Alternate Season Schedules (PASS)," National Football League (NFL), PI: M. Karwan (50%), Co-PI: C. Murray (50%), \$308,358, 10/1/18 - 9/31/21.
3. "DURIP: Meta-Autonomy," Office of Naval Research, PI: C. Murray (20%); Co-PIs: J. Crassidis (20%), C. Qiao (20%), K. Rajan (20%), M. Sudit (20%). \$392,816, 6/1/18 - 5/31/19.
2. "RIGORS - UAV Flight Simulator," Office of Naval Research (through CUBRC, Inc.), PI: C. Murray (100%). \$37,295, 2/6/17 - 4/7/17.
1. "Communication Optimization of Networks of Cross-Domain Unmanned Systems (CONEXUS)," Office of Naval Research (through CUBRC, Inc.), PI: C. Murray (50%); Co-PI: M. Sudit (50%). \$70,277, 10/15/15 - 6/30/17.

Awarded, Auburn University (\$1,084,635):

9. "Lane Change/Merge Fundamental Research: Phase 1," U.S. Federal Highway Administration (FHWA), \$303,486, PI: D. Bevly, Co-PI: C. Murray, 10/1/14 - 12/31/15
8. "Human-Machine Task Allocation Problems," Air Force Research Laboratory (AFRL) Munitions Directorate, \$99,419, PI: C. Murray, 8/27/14 - 8/26/16
7. "Information and Decision Recommender (SBIR Phase I)," U.S. Navy (through Archarithms, Inc.), \$24,000; PI: C. Murray, 8/4/14 - 3/2/15
6. "Multi-UAV Simulation," Defense Advanced Research Projects Agency (DARPA, through IS4S Inc.), \$14,999; PI: C. Murray, 5/20/14 - 8/1/14
5. "Heavy Truck Cooperative Adaptive Cruise Control: Evaluation, Testing, and Stakeholder Engagement for Near Term Deployment," U.S. Federal Highway Administration (FHWA), PI: D. Bevly, \$40,934; 10/1/13 - 9/30/15.
4. "Optimization of Warehouse Material Handling Strategies to Reduce Worker Injuries," Deep South Center for Occupational Health & Safety, \$12,735; PI: C. Murray, 7/1/13 - 6/30/14.
3. "Realizing Information Gain through Optimization of Reconnaissance and Surveillance (RIGORS)," Office of Naval Research (through CUBRC, Inc.), \$204,154; PI: C. Murray, 6/1/13 - 9/9/17
2. "REU Site on Smart Unmanned Aerial Vehicles (UAVs)," National Science Foundation, \$324,908, 5/15/12 - 4/30/15, Co-PI with S. Biaz.
1. "Improving Air Traffic: A Graph Theory Approach," NASA Graduate Student Researchers Program (GSRP), \$60,000. Grantee: C. Williams; PI: C. Murray, 8/1/11 - 7/31/13.

GRADUATE STUDENTS

- Chair - Graduated, Auburn University:
 - Hung-Yu (Jack) Lee - Ph.D., 2017. "Facility layout and emerging advanced material handling optimization." Industry placement (Akamai Technologies).
 - Nader Al Theeb - Ph.D., 2014. "An Integrated Logistics System for Effective Resource Distribution in Post-disaster Humanitarian Relief Operations." Assistant Professor at Jordan University of Science and Technology.

- Arun Kumar Ranganathan Jagannathan – M.S., 2011. “Vehicle Routing with Cross Docks, Split Deliveries, and Multiple Use of Vehicles.”
- Chair – Graduated, University at Buffalo:
 - Ritwik Raj – Ph.D., 2021. “Optimization of Drone-assisted Last-mile Delivery Systems.” Industry placement (Fidelity Investments)
 - Zachary Steever – Ph.D., 2021. Co-chair with Mark Karwan. “Surrogate Representations and Deep Learning Frameworks for Relating Mixed Integer Linear Programs and Contextualizing the Open Set.” Industry placement (Philadelphia Eagles, National Football League)
 - Lan Peng – Ph.D., 2022. “Emerging Topics in Coordinated Vehicle Routing Problem: Applications from Last-Mile Drone Delivery to Nation-wide Bulk Item Shipping.” Assistant Professor, School of Management, Shanghai University, Shanghai, China
 - Andrew Kopanon – Ph.D., 2024. “On the Deployment Optimization of Sensors and Coverage Path Planning for Drone Inspections.” Industry placement (Avarint)
- Chair – In Progress, University at Buffalo:
 - Dowon Lee – Ph.D.
 - Tara Schroth – Ph.D.
- Committee Member – Graduated, Auburn University:
 - Erdem Çeven – Ph.D. (Kevin Gue, Chair), 2013
 - Jacob Conaway – M.S. CSSE (Richard Chapman, Chair), 2015
 - Mikhail Gordon – M.S. Civil Engr. (Rod Turochy, Chair), 2015
 - Masood Jabarnejad – Ph.D. (Jorge Valenzuela, Chair), 2015
 - David Jones – M.S. CSSE (Saad Biaz, Chair), 2015
 - Ozgur Kabadurmus – Ph.D. (Alice E. Smith, Chair), 2013
 - Seyedamirabbas Mousavian – Ph.D. (Jorge Valenzuela, Chair), 2014
 - Ashkan Negahban – Ph.D. (Jeff Smith, Chair), 2014
 - Elif Ozgormus – Ph.D. (Alice E. Smith, Chair), 2015
 - William Swaim – M.S. (John Evans, Chair), 2011
- Committee Member – Graduated, University at Buffalo:
 - Hadi Feyzollahi – Ph.D. (Jose Walteros, Chair)
 - Cai Gao – Ph.D. (Jose Walteros, Chair)
 - Kyle Hunt – Ph.D. (Jun Zhuang, Chair)
 - Yashar Khayati – Ph.D. (Jamie Kang & Mark Karwan, Co-chairs)
 - Ethan Malinowski – Ph.D. (Mark Karwan, Chair)
 - Reza Mohammadi – Ph.D. (Qing He, Chair)
 - Qingyang Xiao – Ph.D. (Jamie Kang, Chair)
 - Xiaohang Zhu – Ph.D. (Jamie Kang, Chair)
- Committee Member – In Progress, University at Buffalo:
 - Ian Unson – Ph.D. (Jun Zhuang, Chair)
 - Yusuf Ihsan Tokel – Ph.D. (Jun Zhuang, Chair)

UNDERGRADUATE MENTORING

- Advised undergraduate student research projects:
 - University at Buffalo – 9 students
 - Auburn University – 10 students

TEACHING EXPERIENCE

- University at Buffalo (2015–present)
 - EAS 305 – *Applied Probability and Statistics*. University at Buffalo, Fall 2024.
 - IE 326 – *Planning for Production and Service Enterprises*. University at Buffalo, Fall 2015, 2016, 2017.
 - IE 459/500 – *Special Topics: Supply Chain Engineering*. University at Buffalo, Spring 2016.
 - IE 482/582 – *Special Topics: Robotics*. University at Buffalo, Fall 2016–2021, Spring 2023–2024.
 - IE 502 – *Individual Problems: Machine Learning*. University at Buffalo, Spring 2018.
 - IE 555 – *Programming for Analytics*. University at Buffalo, Spring 2017–2023, Fall 2023.
 - IE 670 – *Special Topics: Dynamic Data Visualization and Optimization*. University at Buffalo, Spring 2019–2024.
- Auburn University (2010–2015)
 - COMP 4960 – *Special Problems – Quadcopter Design*. Auburn University, Spring 2013.
 - INSY 3410 – *Deterministic Operations Research*. Auburn University, Fall 2010 – 2014.
 - INSY 4960 – *Special Problems – Algorithms for Autonomous Navigation*. Auburn University, Spring 2013.
 - INSY 4970/7970 – *Vehicle Routing & Logistics*. Auburn University, Spring 2014.
 - INSY 5250/6250/6256 – *Scheduling & Project Management*. Auburn University, Fall 2011.
 - INSY 7420/7426 – *Linear Programming & Network Flows*. Auburn University, Spring 2011 – 2015.
 - INSY 7430 – *Integer & Nonlinear Programming*. Auburn University, Fall 2012.
 - INSY 7940 – *Special Problems – Supply Chain Engineering*. Auburn University, Co-taught with Kevin Gue, Spring 2014.
- University at Buffalo (2006)
 - EAS 305 – *Applied Probability*. University at Buffalo, Fall 2006.
 - IE 374 – *Introduction to Operations Research: Probabilistic Models*. University at Buffalo, Spring 2006.

CONFERENCE PRESENTATIONS

45. D. Lee, M. Sudit, C. Nebelecky, J. Dening, C. Murray, “Scheduling ground-to-satellite communications with cislunar orbits and interception risk.” INFORMS Annual Meeting, Seattle, WA. October 2024.
44. L. Peng, C. Murray, “Parallel Drone Scheduling Traveling Salesman Problem Considering Winds and Rains.” INFORMS Annual Meeting, Indianapolis, IN. October 2022.
43. L. Peng, C. Murray, “Dynamic parallel drone scheduling traveling salesman problem with weather impacts.” INFORMS Annual Meeting, Virtual. October, 2021.
42. D. Lee, C. Murray, “Updates To The Tex2solver Online Tool.” INFORMS Annual Meeting, Virtual. October, 2021.
41. C. Murray, “SOAR: An Overview of UB’s New Drone Testing Facility.” 2nd Buffalo Day for 5G and Wireless Internet of Things, Buffalo, NY (virtual). November 2020.
40. D. Lee, C. Murray, “Tex2solver: An Online Tool To Convert LaTeX To Solver Code.” INFORMS Annual Meeting, Virtual. November 2020.

39. R. Raj, C. Murray, "The Time Dependent Multiple Flying Sidekicks Traveling Salesman Problem: Parcel Delivery With Multiple Drones During Congestion." INFORMS Annual Meeting, Virtual. November 2020.
38. L. Peng, C. Murray, "Optimization Of Pick-up And Delivery Orders Bundling Problem." INFORMS Annual Meeting, Virtual. November 2020.
37. Z. Steever, C. Murray, "Classification And Relation Of Mixed Integer Programs Using Graph Convolutional Networks." INFORMS Annual Meeting, Virtual. November 2020.
36. C. Murray, L. Peng, "A Vehicle Routing Visualization Toolkit for Drones." INFORMS Annual Meeting, Seattle, WA. October 2019.
35. Z. Steever, M. Karwan, C. Murray, "An Image-based Approach to Detecting Structural Similarity Among Mixed Integer Programs." INFORMS Annual Meeting, Seattle, WA. October 2019.
34. R. Raj, C. Murray, "Fly slower, deliver faster: The multiple flying sidekicks traveling salesman problem with variable drone speeds." INFORMS Annual Meeting, Seattle, WA. October 2019.
33. R. Raj, M. Karwan, C. Murray, L. Sun, "A Framework for Pricing Components in a Bundle with Depreciative Reservation Prices." INFORMS Annual Meeting, Seattle, WA. October 2019.
32. R. Raj, C. Murray, "Drone Delivery with Time Dependent Travel." IIE Annual Conference, Orlando, FL. May, 2018.
31. C. Murray, "Drone Delivery with Time Dependent Travel." INFORMS Annual Conference, Houston, TX. October, 2017.
30. C. Murray, "Drones in Logistics: Routing and Scheduling of UAVs for Parcel Delivery." IIE Annual Conference, Pittsburgh, PA. May, 2017.
29. M. Worden, C. Murray, M.H. Karwan, H. Ortiz-Pena, A.S. Barkousaraie, "Optimization of information collection and distribution across a limited communications network." IIE Annual Conference, Pittsburgh, PA. May, 2017.
28. Z. Steever, C. Murray, M.H. Karwan, "Dynamic Courier Routing for a Food Delivery Service." IIE Annual Conference, Pittsburgh, PA. May, 2017.
27. H.-Y. Lee, C. Murray, "Heuristic Approaches For Advanced Pick, Place, And Transport-vehicle Routing Optimization Problems: Applications In Warehouse Order Picking Robotics." IIE Annual Conference, Pittsburgh, PA. May, 2017.
26. J. Walteros, C. Gao, C. Murray, "On Routing Unmanned Aerial Vehicles For Surveillance And Reconnaissance Activities." IIE Annual Conference, Pittsburgh, PA. May, 2017.
25. C. Murray, "Mission Planning For Unmanned Aerial Vehicles And Human Operators." INFORMS Annual Meeting, Nashville, TN. November, 2016.
24. H.-Y. Lee, C. Murray, "Heuristic Approaches For Advanced Pick, Place, And Transport-vehicle Routing Optimization Problems: Applications In Warehouse Order Picking Robotics." INFORMS Annual Meeting, Nashville, TN. November, 2016.
23. Y. Khayati, J.E. Kang, M.H. Karwan, C. Murray, "Household Use Of Autonomous Vehicles: Modeling Framework And Traveler Adaptation." INFORMS Annual Meeting, Nashville, TN. November, 2016.

22. M. Worden, C. Murray, M.H. Karwan, H. Ortiz-Pena, A.S. Barkousaraie, "Optimization Of Information Collection And Distribution Across A Limited Communications Network." INFORMS Annual Meeting, Nashville, TN. November, 2016.
21. "Impacts of warehouse layout parameters under new autonomous warehousing systems." IIE Annual Meeting, Anaheim, CA. May, 2016.
20. "Space Utilization Aspects in Facility Layout Designs for Semiconductor Manufacturing Systems." IIE Annual Meeting, Nashville, TN. May, 2015.
19. "The Flying Sidekicks Traveling Salesman Problem: Drone-assisted Parcel Delivery Optimization." IIE Annual Meeting, Nashville, TN. June, 2015. Presented by Amanda Chu.
18. "Optimal Truck Sequencing for Equitable Platooning Operations." IIE Annual Meeting, Nashville, TN. June, 2015.
17. "Optimization of Warehouse Material Handling Strategies to Reduce Worker Injuries." Deep South Center for Occupational Health and Safety, Emerging Issues and Research Symposium, Opelika, AL. April, 2015.
16. "Sensor Tasking for Unmanned Aerial Vehicles with Limited Communications Bandwidth." INFORMS Annual Conference, San Francisco, CA. November, 2014.
15. "Routing of Autonomous UAVs in Unmapped Environments." IIE Annual Meeting, Montreal, Canada. May, 2014.
14. "Routing of Autonomous UAVs in Unmapped Environments." INFORMS Annual Conference, Minneapolis, MN. October, 2013.
13. "Pareto Optimal Solutions for a Double Row Layout Problem." INFORMS Annual Conference, Phoenix, AZ. October, 2012.
12. "Incorporating Human-Factors Considerations in Unmanned Aircraft Routing." 80th MORS Symposium, Colorado Springs, CO. June, 2012.
11. "Vehicle Routing with Cross Docks." IIE Annual Meeting, Orlando, FL. May, 2012.
10. "Incorporating Human-Factors Considerations in Unmanned Aircraft Routing." Session Chair, INFORMS Annual Conference, Charlotte, NC. November, 2011.
9. "Incorporating Human-Factors Considerations in Unmanned Aircraft Routing." Invited Session, IIE Annual Meeting, Reno, NV. May, 2011.
8. "Dynamic Rerouting of Unmanned Aerial Vehicles." Session Chair, INFORMS Annual Conference, Austin, TX. November, 2010.
7. "Dynamic Airborne Resource Reassignment with Anticipatory Targets." INFORMS Annual Conference, San Diego, CA. October, 2009.
6. "A General Model and Solution Approaches for Dynamic Vehicle Re-routing." CORS-INFORMS International Meeting. Toronto, Canada. June, 2009.
5. "Cooperative ISR Utilizing Airborne Reconnaissance Platforms and Unmanned Aircraft Systems." Invited Session, INFORMS Annual Conference. Washington, DC. October, 2008.

4. "A Comparison of Optimal Pricing Strategies under Various Risk Considerations." INFORMS Annual Conference. Washington, DC. October, 2008.
3. "A General Modeling Framework for Course of Action in UAV Routing." 8th International Conference on Cooperative Control and Optimization. Gainesville, FL. January, 2008.
2. "Joint Optimization of Retail Price and Shelf-Space Allocation with Stochastic Demands." INFORMS Annual Conference. Seattle, WA. November, 2007.
1. "Joint Optimization of Retail Price and Shelf-Space Allocation with Stochastic Demands." POMS Annual Conference. Dallas, TX. May, 2007.

INVITED TALKS

13. "Drones in Industry: An Overview of State-of-the-art Flying Robots." Presented to the Flemming Creativity, Entrepreneurship and Economic Development Center at Penn State Berks, Virtual, November 14, 2022.
12. "Developing Operations Research Software for Operations Researchers." University of Houston, Virtual, October, 22, 2021.
11. Panel member for "Where is the Money? Non-Traditional Research Funding" University at Buffalo Office of Research Advancement, February, 2018.
10. Panel member for "Technology and Freight Delivery Showcase" hosted by the Eno Center for Transportation, Washington, DC. January, 2017.
9. "Drones in logistics: Optimal routing and scheduling of flying robots for small parcel delivery." University of Houston, Houston, TX. October, 2016.
8. "A ROS-based Testbed for Visualizing and Controlling Vehicle Fleets." Air Force Research Lab, Rome, NY. June, 2016.
7. "Drones in Logistics: From the Battlefield to your Front Door." University at Buffalo, Buffalo, NY. February, 2015.
6. "Drones in Logistics: From the Battlefield to your Front Door." Logistics and Distribution Institute, University of Louisville, Louisville, KY. November, 2014.
5. "Optimization Approaches for Routing and Scheduling Unmanned Aircraft." Transportation Working Group, Mississippi State University, Starkville, MS. January, 2014.
4. "Tips for Surviving the Academic Job-Search Process." INFORMS Student Chapter, Mississippi State University, Starkville, MS. January, 2014.
3. "Optimization for UAS Mission Planning and Dynamic Asset Allocation." Auburn Engineering Day, Huntsville, AL. September, 2013.
2. "Dynamic Reassignment and Rerouting in Cooperative Airborne Operations." Seminar Series, Department of Industrial & Systems Engineering, University at Buffalo. April, 2010.
1. "Dynamic Reassignment and Rerouting in Cooperative Airborne Operations." Faculty Interview, Auburn University. December, 2009.

IN THE NEWS

- “How UB aims to build on the AI boom“, Buffalo News, Janet Gramza, Mar. 12, 2024. https://buffalonews.com/news/local/how-ub-aims-to-build-on-the-ai-boom/article_923d5be2-dbda-11ee-983c-37b9190702f4.html
- “Your Drone-Delivered Coffee is (Almost) Here”, The Wall Street Journal, Christopher Mims, Mar. 30, 2019. <https://www.wsj.com/articles/your-drone-delivered-coffee-is-almost-here-11553918415>
- “Disruptive Technology: Will Driverless Trucks and Drones Change Delivery Systems?”, MHI Solutions, Volume 3, Issue 2, March 17, 2015, Mary Lou Joy, pp. 22–26. <http://www.nxtbook.com/naylor/MHIQ/MHIQ0215/index.php#/22>
- “Drone incidents near airports raise concerns”, WLKY Louisville News, Steve Burgin, Nov. 20, 2014. <http://www.wlky.com/news/drone-incident-near-airports-raise-concerns/29846808>
- “Drones: Delivering the future”, The Louisville Cardinal, Kylie Noltemeyer, Nov. 20, 2014. <http://www.louisvillecardinal.com/2014/11/drones-delivering-the-future/>
- “A revolution hits warehousing”, Material Handling Wholesaler, Mary Glindinning, Oct. 20, 2014. <https://www.mhwmag.com/features/a-revolution-hits-warehousing/>
- “Professor gives glimpse into future with drones”, The Auburn Plainsman, Ben Ruffin, July 10, 2014. <https://www.theplainsman.com/article/2014/07/professor-gives-glimpse-into-future-with-drones>

AWARDS & HONORS

- Graduate Research Assistantship, University at Buffalo, 2007 – 2010
- Presidential Fellowship, University at Buffalo, 2005 – 2009
- Graduate Teaching Assistantship, University at Buffalo, 2005 – 2007
- Intel D1C Divisional Award, 2005
- Graduate Teaching/Research Assistantship, Texas A&M University, 1999 – 2000
- Graduated Cum Laude, Texas A&M University, 1999
- Passed the Fundamentals of Engineering Exam (EIT), 1998
- College of Engineering Distinguished Student Award, Texas A&M University, 1997
- Member of Alpha Pi Mu Honor Society for Industrial Engineers since 1997

SERVICE ACTIVITIES

University Service, University at Buffalo

- Faculty Representative, Grievance Committee, School of Engineering and Applied Sciences (SEAS), 2024-2025.
- Faculty advisor, Senior design course, Department of Mechanical and Aerospace Engineering, 2024.
- Faculty advisor, UB Drone Club, 2022 – present.
- Co-coordinator for Departmental Student Poster Competition, 2020 – 2022.
- Coordinator for Departmental promotional booths at professional conferences, to boost awareness of the Department and the University, IIE Annual Conference 2017, INFORMS Annual Meeting 2017, IIE Annual Conference 2018.
- Faculty advisor for University at Buffalo INFORMS Student Chapter, 2016 – 2023.
- Member, Graduate Affairs Committee, Department of Industrial & Systems Engineering, 2017 – 2021.
- Co-chair for Praxair Seminar Series, Department of Industrial & Systems Engineering, 2015 – 2017.

University Service, Auburn University

- University Reader, Brad Dennis dissertation (CSSE), 2014
- Founder and faculty advisor for Auburn University INFORMS Student Chapter, 2013 to 2015
- Faculty mentor for Computer Science and Software Engineering (CSSE) Senior Design projects, Fall 2013 & Spring 2014
- Faculty mentor for Electrical and Computer Engineering (ECE) Senior Design project, Spring 2014
- Judge for Auburn University College of Engineering Graduate Research Showcase, 2012 – 2014
- Department Representative, Auburn University United Way, 2013
- Department Representative, Auburn University Faculty & Staff Giving Campaign, 2013
- Member of Curriculum Committee for Department of Industrial & Systems Engineering, 2012 to 2015
- Member of Undergraduate Enrollment Committee for Department of Industrial & Systems Engineering, 2012 to 2015
- Judge for Auburn University Research Forum, 2012
- University Reader, Emily Doucette dissertation (Aerospace), 2012
- Departmental representative for Engineering Departmental Research Working Group, 2011 to 2015

Professional Service – Review Panels

- NSF panel reviewer, 2018 and 2021
- External reviewer for National Center for Intermodal Transportation for Economic Competitiveness (NCITEC), 2012 and 2013

Professional Service – National Organizations

- Board Member, IIE Logistics and Supply Chain (LSC) Division, 2014–2016
- Council Member, INFORMS Military Applications Society, 2012–2017
- Member of Institute for Operations Research and the Management Sciences (INFORMS)
- Member of Military Operations Research Society (MORS)
- Member of Institute of Industrial Engineers (IIE)
- Member of Association of Military Industrial Engineers (AMIE)
- Member of Institute of Electrical and Electronics Engineers (IEEE)

Professional Service – Editor and Referee

- Referee for numerous journals, including *Annals of Operations Research*, *Computers and Operations Research*, *Computers & Industrial Engineering*, *European Journal of Operational Research*, *IEEE Transactions on Systems, Man, and Cybernetics*, *IIE Transactions*, *INFORMS Journal on Computing*, *International Journal of Production Economics*, *International Journal of Production Research*, *International Transactions on Operational Research*, *Journal of the Operational Research Society*, *Naval Research Logistics*, *Networks*, *Omega*, *Operations Research*, *Production and Operations Management*, *Transportation Research Part B*, *Transportation Research Part C*, *Transportation Research Part E*, and *Transportation Science*. 2010 – present
- Co-editor of special issue on “Computational Operations Research for Drone Systems” in *Computers and Operations Research* with Alice Smith – 2018

Professional Service – Conference Participation

- Cluster Chair for INFORMS Annual Conference on “Drone Delivery Systems”, INFORMS Annual Conference, 2017
- Organizer for two sessions on “Mission Planning” at INFORMS Annual Conference, 2014
- Session Moderator for two panels in the Supply Chain track of the IIE Annual Meeting, 2014
- Session Chair for INFORMS Annual Conference, Operations Research in Military Applications, 2014
- Cluster Chair for INFORMS Annual Conference, Homeland Security & Defense, 2013
- Organizer for three sessions on “Military Vehicle Routing Problems” at INFORMS Annual Conference, 2012
- Judge for IIE Regional Student Conference, hosted by Auburn University, 2012
- Panelist for Student Reception at INFORMS Annual Conference, 2011
- Organizer for three sessions on “Military Vehicle Routing Problems” at INFORMS Annual Conference, 2011
- Session Chair, IIE Annual Meeting, 2011
- Organizer for two sessions on “Military Vehicle Routing Problems” at INFORMS Annual Conference, 2010