Abhay Sobhanan

Ph.D. Candidate · Industrial Engineering

University of South Florida College of Engineering
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Research Interests

Applications: Transportation, Warehouse Operations

Methodology: Exact combinatorial optimization, Heuristics, Machine Learning, Reinforcement Learning

Education

University of South Florida — *Tampa, United States*
Ph.D. in Industrial Engineering — *August 2020 - May 2025*

- Thesis: Optimization Approaches for Large-Scale Last-Mile Delivery Problems
- Major Advisor : Dr. Hadi Gard (Charkhgard)
- Co-Advisor : Dr. Changhyun Kwon
- GPA: 4.0/4.0

National Institute of Technology Agartala — *Tripura, India*
BS-MS Mathematics — *August 2014 - May 2019*

- Thesis: Multi Criteria Decision Making using Interval Type-2 Fuzzy Sets
- GPA: 8.45/10.0

Professional Experience

January 2021 - Present	**Graduate Research/Teaching Assistant**, University of South Florida, United States
July 2019 - June 2020	**Research Associate**, Area of Production & Quantitative Methods, Indian Institute of Management Ahmedabad, India
May 2016 - August 2016	**Mitacs Globalink Research Intern**, Department of Mathematics & Statistics, University of Regina, Canada

Publications

Journal Articles

1. **Sobhanan, A.**, Park, J., Park, J., & Kwon, C. (2024). Genetic Algorithms with Neural Cost Predictor for Solving Hierarchical Vehicle Routing Problems. Transportation Science, to appear. `https://doi.org/10.1287/trsc.2023.0369`
2. Golui, S., Pal, C., Manikandan, R., & **Sobhanan, A.** (2024). Optimal control of a dynamic production-inventory system with various cost criteria. Annals of Operations Research, 337(1), 75-103.

Articles under Review

1. [Under review, INFORMS Journal on Computing]
Sobhanan, A., Charkhgard, H., & Dayarian, I. (2024). Equity-Driven Workload Allocation for Crowdsourced Last-Mile Delivery. Optimization Online preprint 27199.
2. [Under review, Computers & Operations Research]
Mahmoudinazlou, S., **Sobhanan, A.**, Charkhgard, H., Eshragh, A., & Dunn, G. (2024). Deep Reinforcement Learning for Dynamic Order Picking in Warehouse Operations. arXiv preprint arXiv:2408.01656.

Refereed Conference Proceedings

1. **Sobhanan, A.**, Mahmoudinazlou, S., Charkhgard, H., & Kwon, C. (2024). A branch-and-price algorithm for emergency humanitarian logistics with a mixed truck-drone fleet. Proceedings of the IISE Annual Conference & Expo 2024. [**Best Paper Award Finalist**, Operations Research Division]

Articles in Preparation

1. **Sobhanan, A.**, Charkhgard, H. & Kwon, C. Chinese Postman Problem with Drones.

Awards, Fellowships, & Grants

2024 **Best Paper Award Finalist**, Operations Research Division, Institute of Industrial and Systems Engineers Annual Conference & Expo 2024. Paper: *A branch-and-price algorithm for emergency humanitarian logistics with a mixed truck-drone fleet*
International Travel Grant ($ 1,500), Office of Graduate Studies, University of South Florida. *For participation in the IISE Annual Conference & Expo 2024.*

2023 **PhD Student Travel Grant ($ 1,000)**, INFORMS TSL Conference 2023 & United States National Science Foundation.

2020 **USF Graduate Fellowship ($ 9,923)**, University of South Florida. *Awarded to selected first year graduate students.*

2018 **Mitacs Globalink Research Internship ($ 6,000 CAD)**, Mitacs, Canada. *Scholarship promoting research among undergraduate students.*

Conference Presentations

1. [To Appear] *Towards Equitable Workload Distribution in Last-Mile Delivery for the Gig Economy: The Dispatch Zone-Wave Problem*
   INFORMS Annual Conference, Seattle, U.S.A. during October 20-23, 2024.
2. *A branch-and-price algorithm for emergency humanitarian logistics with a mixed truck-drone fleet*
   IISE Annual Conference & Expo 2024, Montreal, Canada during May 18 - 21, 2024.
3. *Optimizing Fairness and Efficiency in Heterogeneous Fleet Open Vehicle Routing Problem*
   34th Annual POMS Conference, Minneapolis, U.S.A. during April 25 - 29, 2024.
4. *Solving Large-Scale Multi-Depot Vehicle Routing Problems via Decomposition and Deep Learning*
   INFORMS Transportation and Logistics Society Triennial Conference, Chicago, U.S.A. during July 23 – 26, 2023.
5. *Solving the Multi-Depot Vehicle Routing Problem by a Genetic Algorithm with Learning to Evaluate Individuals*
   INFORMS Annual Conference, Indianapolis, U.S.A. during October 16-19, 2022.
6. *Dynamic Allocation of E-commerce Orders to Order-fulfillment Centers under Disruptions*
   Operational Research Society of India Annual Conference held at IIM Ahmedabad, India during December 15-18, 2019.
7. *Integrated TOPSIS-AHP MCDM using possibility mean and variance in type-2 fuzzy environment*
   International Conference on Applied and Computational Mathematics 2018 held at IIT Kharagpur, India during November 23-25, 2018.

Teaching Experience

Teaching Assistant, University of South Florida

Facilitated weekly practice sessions and discussions, developed exams and assignments, provided constructive feedback on student work, and held regular office hours to support student learning in the following courses:

1. **Deterministic Operations Research / Foundations of Optimization** - ESI 4312 (Fall 2021, Fall 2022, Fall 2023)

2. **Project Management** - EIN 4142/6145 (Summer 2021, Summer 2022, Summer 2023)
3. **Applied Lean Six Sigma** - EIN 4451/6458 (Summer 2023)
4. **Production Control Systems** - EIN 4333/6336 (Spring 2022)
5. **Probability and Statistics for Engineers** - EGN 3443 (Spring 2021)

Tutorial Talks

1. *Introduction to Machine Learning Models*
   Data Science Bootcamp 2024 by INFORMS Student Chapter at University of South Florida on April 19, 2024.
2. *Attention Networks for Combinatorial Optimization*
   Presentation for INFORMS Student Chapter at University of South Florida during Fall 2023.

Outreach & Professional Development

Consultation

- **Cobblestone Milk Cooperative** during Summer 2021.
  Developed an optimization software for milk transportation logistics using Julia in collaboration with Sasan Mahmoudinazlou and Changhyun Kwon.

Service and Outreach

- Tutor for Giunta Middle School, Tampa, through Bright Young Minds Alliance at University of South Florida during Fall 2023 - Spring 2024.
- Session Chair for Routing and Consolidation Issues in Logistics at 2022 INFORMS Annual Meeting, Indianapolis.
- Student Officer, INFORMS Student Chapter at USF during Fall 2021 - Summer 2023.
- Professional Chair, Tau Beta Pi - Florida Gamma Chapter during Fall 2022.

Peer Review

Optimization Letters
Transportation Research Record
Socio-Economic Planning Sciences
Transportation Research Board Annual Meetings
IISE Annual Meeting 2024

Professional Memberships

INFORMS
POMS
IISE