VANESSA ANN BEDDOE SAWKMIE

+1 608 867 7930 | sawkmie@wisc.edu | www.linkedin.com/in/vanessasawkmie| Madison, WI 53703

SUMMARY

Experienced in mathematical modeling and mixed-integer programming. My research focuses on developing and solving discrete and stochastic optimization models for large-scale operations.

EDUCATION

University of Wisconsin - Madison
Ph.D in Industrial Engineering, Minor in Computer Science — *Jan '21 - Present*
Advisor: Prof. Jeffrey Linderoth

University of Wisconsin - Madison
Master of Science in Computer Sciences — *Sept '23 - May '25*

Indian Institute of Technology Bombay, Mumbai
Master of Science in Operations Research — *Jul '17 - May '20*

St. Stephen's College, University of Delhi, Delhi
Bachelor of Science in Mathematics (Honors) — *Jul '14 - May '17*

RESEARCH EXPERIENCE

Research Assistant — *Dec '22 - Present*
Jeff Linderoth Optimization Group, UW - Madison

Route 'em and Count 'em: Two-stage stochastic integer programming approach in undersea warfare

- Developed an optimization model to route search assets, maximizing the expected number of targets detected.
- Created a simulation model to sample target movement trajectories and detection probabilities.
- Implemented Branch and Cut Benders' algorithm in Python using Gurobi, and conducted computational experiments, demonstrating its efficacy over the deterministic model for large-scale instances.
- Leveraged problem structure to develop a closed-form solution for the second stage of the stochastic program.

Flexible Resource Job Scheduling: A Mixed Integer Programming Approach

- Developed two mixed integer optimization models, a disjunctive non-linear model and a time-indexed linear model to solve the flexible machine speed and job scheduling problem with precedence and capacity constraints.
- Conducted extensive computational experiments using Gurobi to analyze the lower bounds given by the models.
- Completed the Innovation to Market (I2M) program, hosted by UW-Madison's Discovery to Product Vertical, and completed a customer discovery process structured on Lean Launchpad methodology.

Research Assistant (Industry Project) — *Feb '21 - Dec '21*
Center for Quick Response Manufacturing, UW - Madison

Design of an inventory control system to combat delivery issues, Littelfuse

- Identified flaws in the current job-shop system and created a visual flow map of the assembly area.
- Evaluated the Paired-cell Overlapping Loops of Cards with Authorization (POLCA) inventory control system's prerequisites for feasibility and provided recommendations to facilitate its implementation.

Research Assistant — *Jan '19 - Dec '19*
Prof. Jayendran Venkateswaran's Simulation and Optimization Group, IIT Bombay

Carbon-Policy Modeling and Analysis: Sustainable Supply Chain Management

- Completed a rigorous literature review on SSCM and quantitative OR methods used in this area.
- Built facility location optimization models and analyzed the trade-offs between total cost, carbon emitted and carbon credits purchased under varied policies - Carbon Cap, Carbon Tax and Carbon Cap-and-Trade Policy.

Decision Making Simulator for Supply Allocation under Uncertainty

- Created a simulation-based testbed for evaluation of supply distribution strategies in a single product multi-period two-stage social welfare supply chain with a divergent network configuration.
- Demonstrated the testbed using a scenario based on the existing supply network of the SoULS Project[1].

COURSE PROJECTS

Approximating Traveling Salesman Problem (TSP) Using Matching

- Reviewed Minimum Spanning Tree Heuristic, Christofides's algorithm & Asymmetric TSP Heuristic.
- Compared approximate algorithms for metric graphs with exact DFJ algorithm with data of 600^+ cities.

Optimal Selection of Airport Runway Configurations

- Studied the modeling of the runway configuration management problem and arrival/departure runway balancing problem as a mixed integer linear program, to minimize delay and cost.

PUBLICATIONS

- V. Sawkmie, J. Linderoth. "Route 'Em and Count 'Em: A Two-stage stochastic integer programming Approach"(in preparation)
- V. Sawkmie, J. Linderoth. "Flexible Resource Job Scheduling: A Mixed Integer Programming Approach" 2024 Informs Optimization Society Conference, Houston
- V. Beddoe, S. Shiradkar, J. Venkateswaran. "Decision Making Simulator for Supply Allocation under Uncertainty." 2019 IEEE International Conference on IEEM, Macau.

TECHNICAL SKILLS

Computer Languages	Python, R Programming
Software	Excel, LaTeX, Vensim, Arena, AnyLogic, QMS, Mastercam, MPX
Solvers and Modelling Tools	AMPL, Gurobi, Pyomo

CONFERENCE TALKS

- INFORMS Annual Meeting, Seattle *Oct'24*
- INFORMS Security Conference, Arlington *Jul '24*
- International Symposium for Mathematical Programming, Montreal *Jul '24*
- INFORMS Optimization Society Conference, Houston *Feb '24*
- IEEE Conference on Industrial Engineering and Engineering Management, Macau *Dec '19*

RELEVANT COURSES

Integer Programming	Combinatorial Optimization	Stochastic Programming	Facility Planning
Dynamic Programming	Simulation Modelling & Analysis	Machine Learning	Game Theory

INTERNSHIPS

United Airlines | Chicago *May '25 - Aug '25*

Operations Research Intern, Analytics and Innovation

- Improved performance of a landing-time assignment tool for flights, reducing computation runtime by 70%.
- Implemented performance enhancements that were successfully deployed to production.
- Increased system reliability by guaranteeing solution generation within the time limit cutoff.

McKinsey & Company | India Knowledge Center, Gurgaon *May '19 - Aug '19*

Summer Intern, Manufacturing & Supply Chain Center of Competence

- Developed an interactive production planning and scheduling interface for multiple client engagements.
- Implemented advanced heuristics for scheduling optimization and visualization of dynamic solutions.

[1]SoULS Project is a flagship program of IIT Bombay for distribution of solar lamps at subsidized rates in rural India

HONORS AND AWARDS

- Cohort member of INFORMS "To My Younger Self" 2023 Program.
- Chancellor's Opportunity Award, ISyE, UW-Madison.
- Association for Computing Machinery's Council on Women in Computing (ACM-W) Scholarship
- Represented India as Youth Ambassador to China, Government of India.

TEACHING AND LEADERSHIP EXPERIENCE

President, *INFORMS UW-Madison Student Chapter* *'25*
Vice-President, *INFORMS UW-Madison Student Chapter* *'24*
Treasurer, *INFORMS UW-Madison Student Chapter* *'23*

Teaching Assistant, *UW-Madison* *'21 - '23*
- Simulation and Probabilistic Modeling, Linear Optimization, Introduction to Quality Engineering

Teaching Assistant, *IIT-Bombay* *'19 - '20*
- Systems Dynamics Modeling & Analysis, Discrete Event System Simulation

Head of Institute Student Companion Programme *Department of IEOR, IIT Bombay* *'18*
Editor, *'Optimystic' Department Magazine, IEOR, IIT Bombay* *'18*

EXTRA CURRICULARS AND INTERESTS

- Volunteer for the Frozen Meal Program and the Food Recovery Network, UW - Madison.
- Hoofers Outing Club, Hoofers Skiing Club, Madison Ultimate Frisbee Association.