

VANESSA ANN BEDDOE SAWKMIE

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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, *Advisor: Prof. Jeff Linderoth*

Jan '21 - Present

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

INTERNSHIPS

United Airlines | Chicago

May '25 - Aug '25

Operations Research Intern, Analytics and Innovation

- Improved computational efficiency of a landing-slot optimization tool, reducing computation time by 40%.
- Deployed to production and improved reliability by guaranteeing feasible solutions for large-scale instances.

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.

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.

RESEARCH EXPERIENCE

Research Assistant

Dec '22 - Present

Jeff Linderoth Optimization Group, UW - Madison

WISDOM: Wisconsin Intelligent System for the Detection and Optimization against Marine threats

- Formulated a two-stage stochastic optimization model to assign assets to search patterns (areas with time intervals) to maximize expected number of target detections.
- Developed a high-fidelity geospatial simulation of target trajectories and probabilistic sensor detections.
- Developing a three-stage model that uses sensor-derived intelligence to inform pattern assignments.

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

- Formulated a model for optimal placement and routing of search assets on a discretized spatial-temporal grid. Built a discrete-grid simulation framework to sample target trajectories and probabilistic detections.
- Implemented Branch and Cut Benders' algorithm and leveraged problem structure to develop a closed-form solution for the second stage of the stochastic program, enabling inexpensive generation of Benders' cuts

Flexible Resource Job Scheduling: A Mixed Integer Programming Approach

- Developed and compared 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.

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

- Built facility location optimization models to evaluate cost-carbon trade-offs under varied carbon policies.

COURSE PROJECTS

Approximating Traveling Salesman Problem (TSP) Using Matching

- Implemented and compared heuristic and exact algorithms for TSP on data with 600+ cities.

Optimal Selection of Airport Runway Configurations

- Studied runway configuration and traffic balancing as mixed-integer programs minimizing delay and cost.

TECHNICAL SKILLS

Relevant courses	Stochastic Programming, Integer Programming, Combinatorial Optimization, Simulation Modelling & Analysis, Machine Learning, Game Theory
Computer Languages	Python, R Programming, Julia
Software	Excel, L ^A T _E X, Vensim, Arena, AnyLogic
Solvers and Modeling Tools	Gurobi, AMPL, Pyomo

CONFERENCE TALKS

• INFORMS Annual Meeting, Atlanta	Oct'25
• 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

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

Teaching Assistant,

- Simulation and Probabilistic Modeling, Linear Optimization, Quality Engineering , UW-Madison '21
- Systems Dynamics Modeling & Analysis, Discrete Event System Simulation , IIT-Bombay '19

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.