

# Avinash N. Madavan

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## PERSONAL SUMMARY

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Optimization and ML specialist building scalable systems grounded in rigorous mathematical foundations. Combines theoretical depth with production expertise, and excels at communicating complex technical concepts to diverse audiences.

## PROFESSIONAL EXPERIENCE

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### Terminal49

Independent Consultant

April 2025 – Present

Machine Learning Consultant

- Analyzed large shipping datasets to extract high-value features, improving the accuracy of container ETA predictions.
- Designed and deployed Terminal49's first ETA model, introducing predictive logistics capability that improved shipment tracking and customer reliability.
- Built and validated statistical and machine learning models for ETA estimation, enabling more reliable logistics planning.

### Equinor

Danske Commodities

January 2024 – April 2025

Senior FTR Analyst

- Designed a risk-aware portfolio optimization algorithm, reducing risk and improving market efficiency.
- Developed statistical validation frameworks, increasing the robustness and reliability of forecasting models.
- Integrated model updates into production workflows, improving decision-making accuracy with historical and forecast data.
- Enhanced trading decisions and reduced portfolio risk exposure in day-ahead and real-time power markets.

### University of Illinois at Urbana-Champaign

Electrical and Computer Engineering, Power and Energy Group

August 2016 – December 2022

Graduate Research Assistant

- Researched online optimization methods for risk-sensitive convex problems with provable convergence guarantees.
- Established formal guarantees for pricing mechanisms in power networks under uncertainty, proving conjectured properties.
- Implemented efficient open-source large-scale optimization algorithms (Benders' decomposition, critical region exploration).
- Research contributions formed basis of advisor's NSF CAREER award; collaborated across disciplines and presented to diverse technical audiences.

## PROJECTS

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- Stuka** Developed open-source linear programming algorithms, including Benders' decomposition and critical region exploration, reducing solve time and improving scalability in large-scale optimization. 
- RSHC** Designed a risk-sensitive hosting capacity tool, enabling fast and scalable evaluation of renewable integration in power distribution networks. 

## TECHNICAL SKILLS AND LEADERSHIP EXPERIENCE

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- Leadership Roles** UIUC IEEE PES/PELS/IAS Chapter President May 2019 – August 2020  
IEEE PECL Conference Co-Director May 2019 – May 2020
- Technical Expertise** Convex & Stochastic Optimization, Risk-Sensitive Modeling, Statistical Inference, Uncertainty Quantification, Machine Learning, Time Series Analysis, Distributed Systems, Algorithm Design
- Programming** C/C++, Python, Rust, Java, MATLAB, Bash, SQL
- Tools & Libraries** Gurobi, MOSEK, CPLEX, IPOPT, LaTeX, NumPy, Pandas, scikit-learn, TensorFlow, AWS, Git

## EDUCATION

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- University of Illinois at Urbana-Champaign** Ph.D. in Electrical and Computer Engineering 2016 – 2022  
**University of California - San Diego** B.S. in Mechanical Engineering, Minor in Mathematics 2012 – 2016
- Honors: Graduated cum laude, Phi Beta Kappa

## SELECTED PUBLICATIONS

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- Madavan, A. N., & Bose, S. (2021). A Stochastic Primal-Dual Method for Optimization with Conditional Value at Risk Constraints. *Journal of Optimization Theory and Applications*, 190, 428–460. 
- Madavan, A. N., Dahlin, N., Bose, S., & Tong, L. (2023). Risk-Based Hosting Capacity Analysis in Distribution Systems. *IEEE Transactions on Power Systems*. 