Muting (Don) Ma, Ph.D.

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Operations Management Ph.D. Program - University of Alabama

Strategic Profile

Operations Research Scientist with deep theoretical foundations in optimization, game theory, and stochastic modeling. Specialized in developing decision frameworks that balance competing objectives—particularly **short-term profitability versus long-term sustainability** in technology transitions. Research portfolio totaling **$509K+ in competitive grants**, achieving **20.1% improvement** in predictive accuracy and handling **14,400 vehicles/hour** capacity optimization.

Core Expertise: Primal-Dual Optimization • Nash Equilibrium Analysis • Dynamic Programming • Market Dynamics Modeling • Multi-Objective Decision Frameworks • Predictive Analytics

Education & Academic Training

2025–Present **Ph.D. in Operations Management** (In Progress), University of Alabama
Department: Information Systems, Statistics, and Management Science, Culverhouse College of Business
Research Focus: Competitive dynamics modeling, Market equilibrium analysis
Award: 2nd Place, Culverhouse Data Analytics Summit Poster Competition (2025)

2022–2025 **Postdoctoral Research Associate**, University of Alabama
Employer: Institute of Data & Analytics, Culverhouse College of Business
Research: Feature selection algorithms, Bi-objective optimization, Large-scale simulation

2017–2022 **Ph.D. in Civil Engineering**, University of Louisville
Dissertation: Optimal scheduling of connected and autonomous vehicles at reservation-based intersections
Awards: Grosscurth Fellowship (2017), Doctoral Dissertation Completion Award (2022)

Theoretical Foundations & Coursework

Optimization Theory	Linear Programming (OM 600), Integer Modeling and Optimization (OM 603), Foundation of Optimization I (IE 610), Inventory Management (OM 523), Stochastic Decision Models (OM 601)
Statistical Methods	Mathematical Statistics I (ST 554), Special Topics in Analytics (ST 597), Predictive Modeling with Business Applications (BAN 501)
Game Theory	Game Theory (EC 660)
Computational Methods	Data Mining (CECS 632), Transportation Engineering (CEE 560)
Teaching Experience	Graduate Teaching Assistant for OM 310 - Introduction to Management Science

Research Experience & Strategic Applications

2025–Present **Graduate Research Assistant**, University of Alabama
Ph.D. Operations Management Program
- Developing **primal-dual optimization frameworks** for manufacturer coopetition strategies
- Analyzing **Nash equilibrium conditions** in electric vehicle market transitions
- Quantifying trade-offs between short-term profitability and long-term sustainability

2022–2025 **Postdoctoral Research Associate**, University of Alabama
*Alabama Mobility and Power Center – **$287,751 Grant***
- Developed C2SLM framework achieving **20.1% improvement** in market forecasting accuracy
- Designed **system dynamics model** predicting EV adoption trends for Alabama market
- Built decision support systems for electric vehicle adoption prediction
- Delivered insights to public agencies, automotive industry, and academic institutions
- Led research team of 8+ members across multiple disciplines
- Mentored undergraduate, master's, and doctoral students

2017–2022 **Graduate Research Assistant**, University of Louisville
*NSF Industry-University Cooperative Research Centers – **$45,990 Grant***
- Designed next-generation signal-free interchange control for connected vehicles
- Created traffic intersection optimization models handling **14,400 vehicles/hour** traffic capacity
- Achieved **5% delay reduction** at 1800 vehicles/hour/lane throughput
- Reduced average vehicle delays to **1.8-2.3 seconds** under extreme traffic demands

2019–2021 **Graduate Research Assistant**, University of Louisville
*NCHRP IDEA Project 217 – **$137,000 Grant***
- Developed real-time proactive intersection safety monitoring systems
- Deployed radar-based system adopted by transportation agencies nationwide

*KYTC Highway Safety Improvement Program – **$39,318 Grant***
- Designed safety countermeasures and visualization systems for Louisville (KY, USA) intersections

Quantified Research Impact

Funding & Leadership

• **$509,059** total grants secured	Lead researcher on 4 competitive federal/state grants
• **$287,751** largest single grant	EV market analysis for Alabama Transportation Institute
• **8+** team members led	Cross-functional research teams across disciplines

Technical Performance

• **20.1%** forecasting improvement	C2SLM model vs. industry benchmarks for EV demand
• **14,400** vehicles/hour capacity	Real-time optimization at urban intersections
• **1.8-2.3** seconds average delay	Under extreme traffic conditions (vs. 10+ seconds baseline)
• **5%** delay reduction	Connected vehicle trajectory optimization

Academic Impact

• **3** peer-reviewed publications	Top-tier journals (Pattern Recognition, Transportation Research Part C)
• **13+** conference presentations	INFORMS, TRB, UA Business Analytics Summit
• **2nd Place** poster award	Culverhouse Data Analytics Summit 2025

Technical Competencies

Programming	C++, C#, Python, Java, SQL
Optimization Tools	Gurobi, CPLEX, Visual Studio
Statistical Software	R, Tableau
Systems	Linux
Methods	Linear/Integer Programming, Dynamic Programming, Game Theory, Stochastic Modeling

Publications & Research Contributions

Ma, M., Yavuz, M., et al. (2025). "C2SLM: A Correlation-based Clustering-assisted Sparse Learning Model for Electric Vehicle Market Demand Forecasting." *Pattern Recognition*, 170, p.111984. DOI: 10.1016/j.patcog.2025.111984

Ma, M. & Li, Z. (2023). "A speed-maximization trajectory optimization model on a reservation based intersection control system." *Transportation Research Part C*, 154, p.104266. DOI: 10.1016/j.trc.2023.104266

Ma, M. & Li, Z. (2021). "A time-independent trajectory optimization approach for connected and autonomous vehicles." *Transportation Research Interdisciplinary Perspectives*, 9, p.100312. DOI: 10.1016/j.trip.2021.100312

Li, Z. & **Ma, M.** (2022). "A Real-Time Proactive Intersection Safety Monitoring System Based on Radar Sensor Data." *NCHRP IDEA Project 217* (Technical Report). TRB Link

Ma, M., Yavuz, M. (Working Paper). "Socioeconomic Trade-offs in Connected Vehicle Markets: A Primal-Dual Framework." SSRN: 5372729