

Muting (Don) Ma, Ph.D.

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🏛️ [Operations Management Ph.D. Program - University of Alabama](#)

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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
- **\$287,751** largest single grant
- **8+** team members led

Lead researcher on 4 competitive federal/state grants
EV market analysis for Alabama Transportation Institute
Cross-functional research teams across disciplines

Technical Performance

- **20.1%** forecasting improvement
- **14,400** vehicles/hour capacity
- **1.8-2.3** seconds average delay
- **5%** delay reduction

C2SLM model vs. industry benchmarks for EV demand
Real-time optimization at urban intersections
Under extreme traffic conditions (vs. 10+ seconds baseline)
Connected vehicle trajectory optimization

Academic Impact

- **3** peer-reviewed publications
- **13+** conference presentations
- **2nd Place** poster award

Top-tier journals (Pattern Recognition, Transportation Research Part C)
INFORMS, TRB, UA Business Analytics Summit
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. (2026). "Sustainable Life Management (SLM): Multi-Period Capital Allocation Under Uncertainty." DOI: [10.5281/zenodo.18039750](https://doi.org/10.5281/zenodo.18039750)

Ma, M., Li, Z., & Yavuz, M. (2026). "Connected and Automated Vehicles Scheduling at a Reservation-based Intersection using Dynamic Programming with Dominance Pruning." *International Transactions in Operational Research*. DOI: [10.2139/ssrn.4097173](https://doi.org/10.2139/ssrn.4097173)

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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://ssrn.com/abstract=5372729)