

Alex Carroll

MIT Center for Transportation and Logistics (CTL), Deep Knowledge Lab
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Research Interests

Agentic AI for procurement and supply chain decision-making; supplier intelligence systems across heterogeneous enterprise data; reinforcement learning and dynamic programming for routing and pricing; forecasting and optimization for logistics networks.

Education

Massachusetts Institute of Technology (MIT), Cambridge, MA PhD in Transportation, AI for Supply Chain Systems	2025 – Present (Expected 2028)
Massachusetts Institute of Technology (MIT), Cambridge, MA Master of Applied Science in Supply Chain Management	2023 – 2024
University of Illinois at Urbana-Champaign, Champaign, IL Master of Business Administration	2021 – 2023
The University of Texas at Austin, Austin, TX Bachelor of Arts	2011 – 2016

Research Experience

Massachusetts Institute of Technology, Center for Transportation and Logistics (Deep Knowledge Lab)
2025 – Present
PhD Researcher

- Building agentic AI systems that enable procurement-focused agents to retrieve, reconcile, and synthesize evidence from RFx documents, supplier master data, and contract repositories distributed across heterogeneous data silos and database types.
- Designing end-to-end workflows for supplier intelligence, including document understanding and structured extraction, retrieval over multi-format artifacts, and tool-using agents that generate auditable outputs for sourcing, compliance checks, and contract term comparisons.
- Developing reinforcement learning and dynamic programming methodologies for operational decision problems, including optimal routing in maritime and over-the-road settings under realistic constraints (capacity, service times, and cost structures).

Publications

- Alex Carroll, “Drop Trailer Forecasting in Volatile Networks,” 15th International Conference on Ambient Systems, Networks and Technologies (ANT), Procedia Computer Science, Elsevier, April 2024.

- Alex Carroll, “Drop Trailer Management in Volatile Networks,” Supply Chain Management Review Magazine, June 25, 2025.
- Alex Carroll, “Enhancing Sentiment Classification of E-commerce Reviews for Actionable Insights using LLMs,” IEEE, September 2025.

Working Papers and Preprints

- Alex Carroll, “Fast Barge, Smart Prices: Deep RL for Mississippi Container Service,” submitted to Annals of Operations Research, December 2025 (under review).

Technical Reports and Capstone Work

- Alex Carroll, “Drop Trailer Management in Volatile Networks,” MIT Supply Chain Management Capstone Research, MIT DSpace, May 2024.

Talks and Presentations

- “Drop Trailer Management in Volatile Networks,” SCALE Expo, MIT, January 2024, Presenter.
- “Advanced Analytics for Efficient Supply Chains,” 7th Interdisciplinary Conference on Production, Logistics and Traffic, Darmstadt, Germany, March 2025, Lecturer.
- “Enhancing Sentiment Classification of E-commerce Reviews for Actionable Insights using LLMs,” IEEE High Performance Extreme Computing Conference, September 2025, Presenter.
- “From Silos to Agentic Systems: Leveraging Agentic AI for Supplier Intelligence,” MIT CTL Agentic AI Roundtable, December 2025, Presenter.

Teaching Experience

- AI in Supply Chain and Logistics Management, MIT CTL Summer School, July 2025, Instructor.
- SCM.256 Data Science and Machine Learning for Supply Chain Management, Spring 2026, Teaching Assistant.

Professional Experience

Amazon, Tokyo, Japan Jun 2024 – Aug 2025
Senior Operations Manager, Operations (AMZL)

- Drove an 11% QTR increase in TPH, processed 110,000+ PPD as site leader of 300+ associates, and achieved #1 ranked site metrics (Q3 & Q4) for JP Super Region 3.
- Directed implementation of an AI-driven sortation process, reducing mis-sorts by 9% and saving a projected 11,500 labor hours annually across multiple cycle shifts.

- Streamlined inbound, sortation, and pick workflows, improving average WIP compliance by 10% and contributing to a 5% improvement in PDD rates for outbound deliveries.
- Launched comprehensive safety and productivity initiatives, culminating in a 15% reduction in incident rates and boosting employee engagement scores by 22% from Q2 to Q4 2024.

Flock Freight, San Diego, CA
Senior Analyst, Operations & Analytics

Jan 2022 – Aug 2023

- Managed dynamic pricing model, providing real-time quoting for 60%+ of revenue. Optimized cost and margin estimates for probability-based pooling calculations, responsible for cost accuracy, conversion optimization, and margin maximization.
- Improved costing model accuracy by 10% (MAPE) through tenure, representing a \$6MM YoY improvement in cost savings and a \$4.2MM increase in gross profit.
- Automated pricing processes, resulting in a 40% increase in productivity and allowing strategic focus on higher-level pricing strategies.
- Collaborated cross-functionally with teams in engineering, data science, and product management to implement the APE ML pricing engine, resulting in streamlined automation of pricing processes and a 40% decrease in labor hours.
- Constructed and executed batch rating quoting automation tools for enterprise customers, removing workload equivalent of 4 QA associates.
- Directed daily pricing audits with Customer Success and Sales teams, assessing historic conversion, gross profit, and cost savings data to determine unique customer-specific uplift and discount strategies.

Zillow, Seattle, WA
Pricing Analyst, Acquisitions

Jun 2021 – Dec 2021

- Led valuation of \$200MM+ in residential real estate utilizing data from internal and external datasets. Analyzed Zillow pricing valuations and risks, leveraging detailed financial models for strategic decision-making.
- Controlled Austin and San Antonio market research to enhance departmental accuracy. Utilized tools such as Tableau, Excel, SQL, Python, and proprietary ML tools.
- Monitored market data, analyzing real-time pricing information for weekly market intelligence reports; enhanced team accuracy (MAPE) by 2.7% through tenure via outlier analysis within the sales funnel.
- Executed 5 adopted proposals within Sales, Data Science, and Market (Austin) specialization groups to revamp efficiency metrics, resulting in an 18% reduction in case time per analyst.

Arrive Logistics, Austin, TX
Pricing Analyst, Strategy

Feb 2017 – Jun 2021

- Developed and performed company pricing strategy through championing strategic and tactical price optimization; promoted best-in-class pricing strategy, helping increase contract revenue by 320% from Jan 2018 to Jan 2021.
- Led multiple deals simultaneously ranging between \$1MM to \$30MM, closing \$150MM+ in revenue through tenure.

- Maintained in-depth knowledge of industry trends, competitor analysis, and market dynamics, providing strategic insights to enterprise clients as well as internal stakeholders.

Skills

- **Technical Skills:** Agentic AI Systems, Decision Intelligence, Reinforcement Learning, Dynamic Programming, Optimization, Statistical Modeling, Forecasting, Supply Chain and Logistics Systems, Procurement and Pricing Analytics, Inventory Management, Revenue and Profit Maximization, Operations Strategy, Lean/Six Sigma, Reverse Logistics, Project Management
- **Social Skills:** Communication, Collaboration, Leadership, Adaptability, Cross-Cultural Competence, Conflict Resolution, Networking, Mentoring and Teaching, Industry and Academic Presentations, Active Listening, Problem Solving
- **Programming:** Python (Pandas, NumPy, SciPy, Matplotlib, Seaborn, Scikit-learn, Statsmodels, TensorFlow, PyTorch), SQL, Git
- **Tools:** Power BI, Tableau, Excel, Snowflake, Salesforce, Slack, Zoom, Word, PowerPoint, LaTeX
- **Languages:** English (Native), Japanese (Intermediate), Spanish (Basic)

Service and Community

Austin Oita Sister City Committee Member
Keep Austin Beautiful Volunteer
Japan Society of Boston (Member)

Professional Memberships

INFORMS (Member)
Transportation Research Board (Member)
World Conference On Transport Research Society (Member)