Hongliang Li

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PROFESSIONAL SUMMARY

PhD Candidate in Industrial Engineering specializing in **pricing optimization**, **marketplace modeling**, and **causal inference**. I build **bi-level optimization frameworks** that jointly optimize demand-side pricing levers and supply-side resource allocation at scale. Experienced in **ML-driven decision systems**, **A/B experimentation**, and deploying end-to-end data pipelines for real-time decision making.

EDUCATION

The Pennsylvania State University *University Park, PA*
Ph.D. in Industrial Engineering *Aug 2026 (Expected)*
Rising Star, ASME Dynamic Systems and Control Division (DSCD), 2025.

Tianjin University *Tianjin, China*
B.S. & M.S. in Civil Engineering *May 2017 & Jan 2020*
Exchange: Nanyang Technological University, Singapore (2019–2020)

RESEARCH EXPERIENCE & IMPACT

Dynamic Pricing & Marketplace Optimization
Penn State — Advisors: Prof. Kovalenko & Prof. Pangborn *Sep 2024 – Present*

- Formulated a **bi-level optimization framework (Stackelberg game)** to model marketplace dynamics: an upper-level platform sets prices/incentives while lower-level participants (suppliers, consumers) respond optimally—directly analogous to ride-pricing and driver incentive problems.
- Developed **ML surrogates** using Input Convex Neural Networks (ICNNs) to approximate combinatorial scheduling value functions, reducing pricing decision latency from minutes to milliseconds.
- Integrating **Conformal Prediction** and **Diffusion Models** to quantify demand uncertainty and produce robust pricing strategies under stochastic, non-stationary conditions.
- Implemented modular Python services with warm-start capabilities for **real-time replanning** as market conditions shift.

Large-Scale Optimization & Experimentation Platform
Penn State — Advisors: Prof. Kovalenko & Prof. Pangborn *Aug 2022 – Present*

- Built an **end-to-end data pipeline** (AWS IoT Core → Timestream) ingesting high-frequency operational data, enabling rapid iteration on optimization models.
- Designed **A/B-style policy experiments** with proper holdout groups to measure causal impact of scheduling and pricing interventions; demonstrated 28.2% cost reduction with statistical significance.
- Solved **large-scale mixed-integer programs** (MIPs) on time-expanded networks for resource matching and dispatch, balancing throughput against service-level constraints.
- Developed a **simulation environment (digital twin)** to backtest pricing policies offline prior to live deployment, reducing risk of experimentation and accelerating iteration cycles.

Research Associate, Demand Forecasting & Analytics
Surbana Jurong–NTU Corporate Lab, Singapore *Jan 2020 – Aug 2021*

- Built **Bayesian time-series models** to forecast demand from noisy, high-dimensional sensor data; models informed real-time operational decisions.
- Conducted **exploratory data analysis** and translated statistical insights into actionable recommendations for cross-functional engineering and business teams.

SELECTED PUBLICATIONS

Li, H., Pangborn, H. C., & Kovalenko, I. (2025). Bi-level Model Predictive Control for Energy-aware Integrated Product Pricing and Production Scheduling. *IFAC-PapersOnLine*. arXiv. **Best Student Paper Finalist**
Li, H., Pangborn, H. C., & Kovalenko, I. (2025). Hierarchical Model Predictive Control for Energy-aware Scheduling of Digital Twin-based Batch Manufacturing Systems. *IEEE Trans. Automation Science and Engineering*.

TECHNICAL SKILLS

Optimization & OR: Bi-level Optimization, MILP/MIQP, Stochastic Programming, Dynamic Programming, Gurobi, CPLEX
Machine Learning: PyTorch (ICNNs, Diffusion Models), Bayesian Inference, Conformal Prediction, Time-Series Forecasting
Causal Inference & Experimentation: A/B Testing Design, Policy Backtesting, Statistical Significance Testing
Programming & Data: Python, SQL, AWS (IoT Core, Timestream), Git, Linux, HPC (Slurm)