Hongliang Li

+1 (814) 862-8126 hjl5377@psu.edu LinkedIn Google Scholar

PROFESSIONAL SUMMARY

Industrial Engineering PhD candidate building **decision-making agents** for real-world, constrained systems using **optimization, learning, and digital twins**. Experienced in **rolling-horizon MIQP/Model Predictive Control (MPC)** and **bi-level optimization** for sequential decision making under uncertainty, with scalable implementations in **Python/MATLAB** using **Gurobi/CPLEX**. Interested in **AI agent optimization**, **agentic RL** (learning + planning), and **automated evaluation** of agent behaviors.

EDUCATION

The Pennsylvania State University, *University Park, PA*
Ph.D. in Industrial Engineering — *Aug 2026 (Expected)*
President, Society of Manufacturing Engineers Penn State Chapter

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

SELECTED AWARDS

Rising Star, ASME Dynamic Systems and Control Division (DSCD), 2025.
Best Student Paper Finalist, ASME Modeling, Estimation and Control Conference (MECC 2025).

RESEARCH EXPERIENCE

Energy-Efficient System-Level Digital Twin for Predictive Scheduling & Control
The Pennsylvania State University — Advisors: Prof. Kovalenko & Prof. Pangborn — *Aug 2022 – Present*

- Engineered a **control-oriented digital twin** to stream runtime data, simulate system dynamics, and support **automated offline evaluation** of candidate policies before deployment.
- Implemented **rolling-horizon MPC/MIQP** with data-driven preview information (orders, pricing signals); achieved **28.2%** energy reduction in simulation while meeting throughput and operational constraints.
- Designed evaluation protocols across uncertain scenarios (forecast errors, demand variation), reporting reliability metrics (constraint satisfaction, cost/throughput trade-offs) to guide robust policy selection.

Bi-level Optimization for Integrated Pricing & Sequential Decision Making
The Pennsylvania State University — Advisors: Prof. Kovalenko & Prof. Pangborn — *Sep 2024 – Present*

- Designed a **bi-level** framework coupling daily pricing decisions (upper level) with hourly **MPC/MIQP** scheduling (lower level), using warm-starts for repeated replanning.
- Trained an **Input Convex Neural Network (ICNN)** surrogate to approximate optimization sensitivities/gradients, accelerating coordination between strategic and operational decision layers.
- Built a scalable pipeline for **agent optimization**: propose decisions → simulate/evaluate in the twin → update decision rules, aligning with research in **agentic learning and automated evaluation**.

Research Associate, Energy Analytics
Surbana Jurong–NTU Corporate Lab, Singapore — *Jan 2020 – Aug 2021*

- Led development of **Bayesian forecasting** models to predict cooling energy demand using diverse environmental datasets; delivered stakeholder-facing insights for operational planning.
- Built data processing and modeling workflows in Python (NumPy/Pandas), translating predictive analytics into decision support for smart infrastructure.

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 batch manufacturing systems using a system-level energy-efficiency digital twin. *IEEE Transactions on Automation Science and Engineering*.

TECHNICAL SKILLS

Decision Optimization & Control: MILP/MIQP, Rolling-Horizon MPC, Time-Expanded Networks, Bi-level Optimization, Stochastic Programming
Learning for Decision Making: Reinforcement Learning (familiar), Input Convex Neural Networks (ICNN), Data-Driven Forecasting (Bayesian)
Programming & Tools: Python, MATLAB, Pyomo, YALMIP, Gurobi/CPLEX, NumPy/Pandas, Git, Linux, HPC batch workflows
Platforms: AWS (IoT Core, Timestream, TwinMaker), Simulation/Digital Twins (model-based evaluation)