

Javal Vyas

javalvyas2000@gmail.com | +44-7570639610 | portfolio | linkedin | github | scholar

Education

| | |
|---|--|
| Imperial College London <i>Ph.D. Candidate in Chemical Engineering</i> | London, UK Sept 2024- Dec 2027 |
| Carnegie Mellon University – Carnegie Institute of Technology <i>Master of Science in AI Engineering in Chemical Engineering</i> CGPA: 3.99/4 | Pittsburgh, USA Aug 2022 - Dec 2023 |

Experience

| | |
|--|-----------------------------------|
| • Optimization and Machine Learning Researcher (Multi-agent AI systems) <i>Ph.D. Student advised by Prof. Mehmet Mercangoz</i> | London, UK Sept 2024 – Present |
| <ul style="list-style-type: none">o Developed GraphRAG system using knowledge graphs for robust sequential decision-making, enabling LLM agents to retrieve and reason over structured data for improved strategy consistency across complex planning scenarios.o Pioneered cut-based reprompting technique treating LLMs as stochastic policies, using optimization cuts to reduce entropy and improve decision consistency in multi-step sequential problems. | |

| | |
|--|--|
| • Engineer 2 <i>KeyLogic</i> | Pittsburgh, USA Jan 2024 – Aug 2024 |
| <ul style="list-style-type: none">o Accelerated large-scale MINLP optimization through neural network surrogate integration, achieving $4\times$ speedup ($1600s \rightarrow 400s$) with zero optimality degradation for complex scheduling problems with 116631 variables and 14186 constraints.o Architected robust data preprocessing and validation framework with ML-based anomaly detection, reducing model failures and improving solution consistency across diverse problem instances. | |

Selected Publications

- M. Gill, **J. Vyas**, A. Markaj, F. Gehlhoff, M. Mercangoz, "Towards Autonomous Fault Management in Process Plants: Leveraging LLM Agents and Digital Twins", *Paper accepted at ETFA-30*(preprint).
- J. Vyas**, M. Mercangoz, "Autonomous Industrial Control using an Agentic Framework with Large Language Models", *Paper accepted at DYCOPS-25* (preprint).
- D. Ovalle, **J. Vyas**, C.D. Laird, I.E. Grossmann, 'Using Machine Learning Surrogates to Bridge Different Time-scales for Optimization of Plant Scheduling and Supply Chain Under Disruptions", *Computer Aided Chemical Engineering* (Vol. 53, pp. 1489-1494, 2024). Elsevier. .

Presentations and Lectures

- **J. Vyas**, M. Mercangoz, 'Autonomous Industrial Control using an Agentic Framework with Large Language Models' *presented at AIChE - Spring Meeting 2025*
- D. Ovalle, **J. Vyas**, C.D. Laird, I.E. Grossmann, 'Using Machine Learning Surrogates to Bridge Different Time-scales for Optimization of Plant Scheduling and Supply Chain Under Disruptions' *presented at ESCAPE-PSE 2024*

Awards

- **Best Poster Award:** ChEMSA Research Forum 2023

Skills

- **Languages:** Python, Julia, Matlab, C++, Git/Github, Gurobi, GAMS
- **Packages:** LangChain, LangGraph, CrewAI, Pytorch, TensforFlow, Huggingface, Pyomo, OMLT, Sklearn,
- **General Coding:** Linux, Python Package Development, Open-source Contributions (3 packages)