Javal Vyas

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Education

Imperial College London — London, UK
Ph.D. Candidate in Chemical Engineering — Sept 2024- Dec 2027

Carnegie Mellon University – Carnegie Institute of Technology — Pittsburgh, USA
Master of Science in AI Engineering in Chemical Engineering | CGPA: 3.99/4 — Aug 2022 - Dec 2023

Experience

- **Optimization and Machine Learning Researcher (Multi-agent AI systems)** — London, UK
  Ph.D. Student advised by Prof. Mehmet Mercangoz — Sept 2024 – Present
  - Investigating various modeling approaches, including Knowledge Graphs and Petri nets, to enhance the interpretability and understanding of LLM-based models.
  - Developed a multi-agent AI framework with a reprompting strategies for adaptive, self-correcting decision-making using advanced LLMs on physical systems and digital twins.
- **Engineer 2** — Pittsburgh, USA
  KeyLogic — Jan 2024 – Aug 2024
  - Architected advanced data validation pipelines, error-checking mechanisms, and dynamic visualization tools to ensure data accuracy and integrity.
  - Integrated machine learning surrogates to improve computational efficiency of optimization models, reducing schedule generation time by 40%.

Publications

J. Vyas, M. Mercangoz, 'Autonomous Industrial Control using an Agentic Framework with Large Language Models", *Paper accepted at DYCOPS-25* (preprint).

J. Vyas, C. D. Laird, I. E. Grossmann, R. M. Lima, I. Harjunkoski, M. Guintoli, J. Poland, 'Optimization model and algorithms for the Unit Commitment problem", *Paper submitted to ESCAPE-35*.

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.* .

M. A. Zamarripa, E. Shamlou, **J. Vyas**, T. Arnold, P. Tominac, M. H. Shellman, and M. Drouven, "An update on project pareto - new capabilities in doe's produced water optimization framework," *In proceedings of FOCAPD 2024.*

Presentations and Lectures

- 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
- **Gold Medal**: IMO level 1 (organized by Science Olympiad Foundation (SOF) — 2015
- **Bronze Medal**: NSO level 1 (organized by Science Olympiad Foundation (SOF) — 2014

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)