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Introduction

Professional Summary

> **A process engineer** holding BASc. & MASc. in **Chemical Engineering** and MASc. in **Mining & Minerals Engineering**, with advanced **data analytics** skills, experienced in **inspecting, designing, optimizing, and evaluating large-scale industrial systems** in conjunction with **simulation, virtual environment training and data-driven** tools to **support design, development, and decision-making** with a focus on **enhancing operational efficiency, identifying potential issues and reducing costs**.

Organizational Culture

- **International work experience** across Asia, Europe, Middle East and North America within diverse cultural settings, built and maintained professional relationships.
- Independent, productive and active **team player**, always met deadlines and delivered projects with high-quality results.
- Skilled in identifying key questions with a root-cause approach, developing clear and compelling argumentation, and crafting effective **project budgets and timelines**.
- Successfully secured **funding** from international organizations including **European Union**.
- Authored **40+ publications** (h-index: 15) & **spoke at multiple international and national** venues.

Technical Summary

- **Engineering Tools**
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- **Programming**
  >
- **Computational Materials**
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Places I've been

Real Life
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Social Media
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Email
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Education

MASc. Mining and Minerals Engineering (2023 – 2025)

The University of British Columbia

Project
> Microwave assisted drying of minerals, with Dr. Ali G. Madiseh

Project Goal > **Retrofitting of conventional drying unit operations** at a local industrial mining partner.

Project Summary > Inspected and evaluated, experimentally and numerically (via Finite Element Modeling in COMSOL), the **feasibility and applicability** of microwave-based heating systems at a local **mining industrial partner** for the **retrofitting of conventional drying unit operations**.

Tasks Performed
> - Performed experimental and numerical analysis of **mineral drying behavior under microwave exposure**. > - Utilized **finite element modeling** (FEM) to simulate heat and mass transfer during drying at various microwave power levels and **mineral types**. > - Conducted comprehensive **energy demand analysis** to evaluate **potential savings** compared to traditional kiln operations.

Skills > Energy Demand Analysis · Exergy & Pinch · COMSOL · FEM analysis · Computational Electromagnetism · Heat Transfer

MASc. Chemical Engineering - Process Design (2012 - 2014)

University of Tehran

Project > Thermo-kinetic modeling of the wet phase inversion process for polymeric membranes fabrication, with Dr. Mohammad Ali Aroon

Project Goal > Developed a **comprehensive thermo-kinetic model** to simulate the wet phase inversion process for fabricating

polymeric membranes, focusing on Multiphysics coupling and accurate prediction of **polymeric flat-sheet membrane structure evolution**.

Tasks Performed
> - Constructed and solved **coupled heat, mass, and momentum transport models under non-equilibrium thermodynamics**, incorporating **moving boundary conditions in multiphase, multicomponent porous systems**. > - Formulated and implemented **partial and ordinary differential equation solvers (PDE/ODE)** to capture the transient dynamics of solvent-nonsolvent exchange and polymer precipitation. > - Wrote custom **code in Fortran, MATLAB, and C++** for high-fidelity numerical simulations and sensitivity analyses. > - **Validated computational results against experimental measurements**, achieving strong agreement in membrane morphology predictions. > - Gained insight into phase separation kinetics, diffusion mechanisms, and the impact of process parameters on membrane performance and structure.

Skills > C++ · Fortran · MATLAB · Transport Phenomena · Numerical Simulation · Mathematical Modeling · Polymer Physics

BASc. Chemical Engineering (2007 - 2011)

University of Tehran

Project
> Simulation and cost evaluation of hot section of BIPC olefin plant, with Dr. Nasim Tahouni

Project Goal > Used **Aspen Hysys** and **Aspen Plus** to evaluate **retrofitting** of industrial scale **petroleum refinery** complex by producing process flow diagram (**PFD**), piping/process & instrumentation diagram (**P&ID**), **cost** and **utility**, pinch and exergy.

Tasks Performed
> - Simulated existing and proposed **process configurations using Aspen HYSYS and Aspen Plus**, focusing on optimizing reactor and separation systems for olefin recovery.
> - Developed and **documented detailed Process Flow Diagrams (PFDs) and Piping & Instrumentation Diagrams (P&IDs)** to map unit operations, control loops, and equipment connectivity. > - Performed **equipment sizing and specification** for heat exchangers, reactors, compressors, and distillation columns based on simulated operating conditions. > - Conducted **cost estimation and utility analysis** (CAPEX and OPEX) to support retrofitting and procurement decisions. > - Applied **pinch analysis and exergy analysis** to evaluate and enhance energy integra-

tion and thermodynamic efficiency across the system. > - Assessed **retrofitting feasibility** by integrating performance data, economic viability, and process safety considerations.

Skills > Aspen HYSYS · Aspen Plus · Aspen Dynamics · Chemical Engineering · Process Simulation · Cost-Benefit Analysis · Exergy

Experience

Process Engineer, University of Limerick, Ireland (2019 - 2022)

University of Limerick

Under an EU Horizon 2020 Marie Sklodowska-Curie Postdoctoral Fellowship.
> Read news here.

Project (I)
> Fluid Bed Spray Dryer Process Monitoring and Engineering, with Dr. Marcus O'Mahony.

Project Goal > Designed and implemented a **data-driven graphical user interface** for real-time **monitoring** and **optimization** of a fluid bed spray drying process by integrating in-line/offline sensor data streams and advanced analytics into an interactive platform.

Tasks Performed
> - Developed an interactive **graphical user interface (GUI) in MATLAB** for real-time data **visualization** and **diagnostics**, supporting both in-line and offline sensor data integration.
> - Integrated and processed **diverse sensor types** including CCD camera feeds (image-based analysis), NIR sensors (unlabeled time-series), Raman spectroscopy probes (localized unstructured signals), and valve states (binary control signals).
> - Performed extensive data preprocessing and cleansing to handle **high-dimensional and heterogeneous datasets** with missing values and sensor noise.
> - Applied **pattern recognition** and signal analysis techniques to identify operational trends, detect anomalies, and support process optimization.
> - Designed pipelines for real-time data ingestion and synchronization from multiple sensor sources, ensuring temporal alignment and reliable analytics under dynamic plant conditions.
> - Collaborated with process engineers and control specialists to translate sensor insights into actionable process improvements and control strategies. **Skills** > Data Analytics · Machine Learning · Data-Driven Process Control · Graphical User Interface · MAT-

LAB · Python
> >

Project (II)
> Continueous Cocrystalization via Hot Melt Extrusion in Phamaceuticals, with Dr. Gavin Walker.

Project Goal > Developed a **data-driven digital twin framework** to address low-yield challenges in continuous crystallization, aiming to enhance product quality, optimize production, and reduce waste and operational costs in pharmaceutical manufacturing.

Tasks Performed
> - Conducted detailed **root-cause analysis** of unit operations to identify inefficiencies affecting yield and product purity in **continuous crystallization systems**.
> - Evaluated the influence of **critical process parameters**—temperature, residence time, screw configuration, and rotation speed—on crystallization outcomes, using both experimental data and simulation insights.
> - Designed and refined **process strategies*** to maximize desired product formation, suppress by-product generation, and reduce procurement and disposal costs.
> - Built a digital twin using advanced **data analytics** and implemented a **machine learning-based process controller**, integrating both real-time (in-line) & historical (offline) **sensor data streams**-Raman spectroscopy.
> - Utilized Density Functional Theory (DFT) and molecular dynamics (MD) simulations to analyze **molecular interactions**, guiding optimal cocrystal formation **pathways** and identifying **key process descriptors**.
> - Integrated **Raman spectrometer** data into a live control system, enabling real-time feedback and control within a continuous manufacturing environment through predictive ML models.

Skills > Process Simulation · Molecular Dynamics · Density Functional Theory · Raman Spectroscopy · Machine Learning
> >