

NIRAJ GOHIL

Jersey City, NJ | (201) 881-5114 | nirajgohil60@gmail.com | linkedin.com/in/nirajg13 | nirajgohil.com

ENERGY SYSTEMS ENGINEER | SYSTEMS ENGINEERING (MBSE) | ENERGY MODELING AND ANALYTICS

PROFESSIONAL SUMMARY

Energy systems engineer and researcher with 6+ years of combined industry and applied research experience in grid-integrated hydrogen production, life cycle assessment, and model-based systems engineering. First author of a peer-reviewed Sustainability paper quantifying carbon-aware electrolyzer operation across five Australian grid regions, with a second methodological paper under review, both with CSIRO Australia and Argonne National Laboratory collaborators. Pairs hourly grid and emissions modeling in Python with SysML and MBSE architecture practice and four years of industrial capacity and constraint planning. Targeting energy systems modeling, systems engineering, and technical product roles in clean energy, grid, and deep-tech hardware.

TECHNICAL SKILLS

Energy and Climate Systems: Life cycle assessment (process-based, spatio-temporal), GREET and 45V clean hydrogen methodology, electrolytic hydrogen production, electrolyzer dispatch modeling, grid carbon intensity modeling, electricity market data (AEMO/NEM, CAISO), techno-economic assessment, decarbonization pathway analysis

Systems Engineering: Model-Based Systems Engineering (MBSE), SysML, Cameo Systems Modeler / Magic Systems of Systems Architect, hetero-functional graph theory (HFGT), Petri nets, system architecture, functional decomposition, interface definition, requirements traceability, latency budgeting, trade studies

Modeling and Analytics: Python (pandas, NumPy, Matplotlib, scikit-learn), system dynamics (Vensim, RK4 integration), gradient boosting forecasting, scenario and sensitivity analysis, time-series data pipelines, model calibration and holdout validation, Streamlit, SQL (foundational), advanced Excel modeling, Tableau, Power BI

Product and Program: Product requirements documents (PRDs), requirement-to-claim traceability, component trade studies, roadmap and sprint execution (Agile, Jira, Confluence), design review facilitation, cross-institutional program coordination, milestone and deliverable tracking, technical documentation and SOPs

PROFESSIONAL EXPERIENCE

Research Engineer, Department of Systems and Enterprises

Stevens Institute of Technology, Hoboken, NJ | Jan 2025 - Aug 2025

- Developed a spatio-temporal life cycle assessment framework for electrolytic hydrogen that resolves emissions and cost at hourly resolution by coupling grid carbon intensity and electricity price data to electrolyzer dispatch decisions.
- Established that process-based LCA is a formal special case of MBSE and hetero-functional graph theory, the methodological result behind two co-authored papers with CSIRO and Argonne National Laboratory researchers.
- Modeled electrolyzer operation, grid interaction, and process interdependency with Petri nets and SysML, enabling carbon intensity attribution under real operating variability rather than annual averages.
- Coordinated a three-institution research program across Stevens, CSIRO Australia, and Argonne National Laboratory, aligning methodology, datasets, and deliverable timelines through to publication.
- Translated model output into decision-ready comparisons of hydrogen production pathways against 45V credit thresholds, emissions performance, and operational feasibility.

Graduate Research Assistant, LINES Lab

Stevens Institute of Technology, Hoboken, NJ | Sep 2024 - Dec 2024

- Built Python data pipelines to ingest, clean, and normalize large hourly electricity generation and emissions datasets across multiple grid regions.
- Applied MBSE to define system boundaries, operands, and processes, then implemented hetero-functional graph structures representing electricity supply, conversion, and hydrogen output.
- Produced analytical tables and time-series figures that supported internal design reviews and methodology refinement.

Research Intern, Energy Systems and Life Cycle Assessment

CSIRO, Australia's National Science Agency, Melbourne, Australia | Jul 2024 - Sep 2024

- Ran hourly, full-year simulations of electrolytic hydrogen production across five Australian states, integrating real-time grid emissions and electricity market data with techno-economic parameters.
- Conducted process-based LCA under time-varying grid conditions, quantifying how operating schedule, grid mix, and technology configuration drive hydrogen carbon intensity and production cost.
- Benchmarked the spatio-temporal method against GREET 45V carbon footprinting to test compliance-relevant differences from annual-average accounting.
- Aligned methodological assumptions with Argonne National Laboratory researchers across Australian and U.S. frameworks, and presented findings to CSIRO Smart Energy leadership within the Hydrogen Decarbonization Mission.

Supply Chain Systems Engineer

Hexaware Technologies, Mumbai, India | Jun 2018 - Dec 2022

- Maintained and validated planning system datasets (demand signals, lead times, capacity parameters) feeding enterprise supply chain planning models.
- Performed capacity and flow analysis across multi-stage manufacturing networks, documenting utilization patterns, bottlenecks, and constraint propagation between production stages.
- Built scenario-based capacity models in Excel to evaluate demand variability, equipment constraints, and time-to-capacity trade-offs, including what-if analysis of buffer sizing and redundancy options.
- Documented planning logic, assumptions, and model structure so analyses stayed repeatable and auditable across planning cycles.

PUBLICATIONS AND INTELLECTUAL PROPERTY

- Gohil, N., Haque, N., Farid, A. M. "Dynamic Carbon-Aware Operation of Electrolytic Hydrogen Production in Australia: A Spatio-Temporal Life Cycle Assessment." *Sustainability*, 18(17), 8716, August 2026. DOI 10.3390/su18178716. Peer reviewed.
- Gohil, N., Haque, N., Elgowainy, A., Farid, A. M. "Enhancing Spatio-Temporal Resolution of Process-Based Life Cycle Analysis with Model-Based Systems Engineering and Hetero-functional Graph Theory." Under peer review. arXiv:2506.00230.
- Gohil, N. "Dynamic Modeling of the U.S. Semiconductor Supply Chain (1990-2025): Advanced Packaging as the Binding Constraint." Zenodo white paper, January 2026. DOI 10.5281/zenodo.18410119.
- U.S. provisional patent application (sole inventor), "Causally Validated Wearable System for Uncertainty-Aware Cognitive-State Detection and Bounded Sensory Intervention," filed July 2026. Patent pending.

EDUCATION

Master of Engineering Management and Systems Engineering

Stevens Institute of Technology, Hoboken, NJ | Jan 2023 - Dec 2024

- GPA 3.64. Provost's Master's Fellowship and Research Scholarship. Coursework: Systems Architecture and Design, Systems Engineering, Project Management of Complex Systems, Decision and Risk Analysis.

Bachelor of Engineering, Automobile Engineering

Pillai HOC College of Engineering and Technology, Navi Mumbai, India | Aug 2013 - May 2018