

Neha Shakelly

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EDUCATION:

- Purdue University, West Lafayette, IN
 - PhD in Environmental and Ecological Engineering (Advisor: Dr. John W. Sutherland) 2020-Present
(Focusing on Industrial Sustainability-Risk and Uncertainty) GPA: 3.94/4.0
 - Masters in Industrial Engineering 2021-2023
(Major in Operations Research) GPA: 3.91/4.0
 - Masters in Aeronautics and Astronautics Engineering 2018-2020
(Thesis in Digital Twins and Material Characterization) GPA: 3.77/4.0
- Amrita University, Coimbatore, Tamil Nadu, India 2014- 2018
 - Bachelor of Technology in Aerospace Engineering GPA: 9.84/10 - University Gold Medalist

PROJECTS:

- **Techno-Economic Analysis (TEA) and Life Cycle Assessment (LCA) for an R&D 100 award-winning novel process of making anisotropic Nd-Fe-B magnets**
(Department of Energy (DOE) funded project with Critical Materials Institute (CMI), Ames National Laboratory, and Lawrence Livermore National Laboratory (LLNL)) (Jan 2023-Present)
 - Establishing a TEA and LCA model for a semi-continuous hot deformation method for making anisotropic Neodymium-Iron-Boron (Nd-Fe-B) permanent magnets.
- **Techno-Economic Analysis (TEA) and Life Cycle Assessment (LCA) of Sustainable Aviation Fuels (SAF)**
(Department of Energy (DOE) funded project with Pacific Northwest National Laboratory (PNNL) and Lanza Tech) (Jan 2021-Present)
 - Working on developing a TEA model for the alcohol-to-jet conversion process to estimate the costs and economic uncertainties in the process chain.
 - Analyzing the environmental impacts by conducting an LCA of the whole process chain.
- **Development of carbon-negative biorefineries** (Jan 2021-Present)
 - Engineered biorefineries to deliver decarbonization solutions with lignocellulosic and algal biomass.
 - Implemented analysis on policy implications, environmental impact, social impact, and financial feasibility in addition to the technical solution itself.
 - My team was a national-level finalist in the AES Innovation Challenge, October 2022.
 - My team also won the regional level of the DOE & NREL Challenge in the category of fossil energy and carbon management for 2 years, February 2022, and February 2023.
- **Optimizing techno-economic viability of solar-wind hybrid microgrids** in Magueyes Island (May 2022-Present)
 - Working on the TEA for deploying microgrids made to harness solar and wind energy on the Puerto Rican Island of Magueyes.
 - Developing a multi-objective optimization model using a genetic algorithm to maximize power output based on resource availability while minimizing costs.
- **Climate Change, Mass Migration, and Gender: non-linear complexity analysis** (May 2022-Present)
 - Developing methods to propose a solution/alleviating measure to address climate change-driven mass migration through technology and research.
 - Establishing a predictive model for country-wise mass migration using dimensional analysis and machine learning models to suggest preventive measures.
- **MASTERS THESIS: Characterization of Carbon-Epoxy composite materials**
 - Developed Finite Element digital twins using damage modeling in Abaqus, for different experiments that can be used to characterize a material completely and validated all the properties obtained from the models with respective experiments.
 - Reduce the time and cost of preparing the specimen to conduct the tests.

TECHNICAL SKILLS:

- Techno-Economic Analysis, Life Cycle Assessment, Process Optimization, Data Analysis
- CODING: Python, MATLAB
- SOFTWARE: SimaPro, GREET, Minitab, Abaqus, Ansys

INTERPERSONAL SKILLS:

- Enthusiastic about brainstorming ideas as a team and utilizing engineering skills to solve problems.
- A strong admirer of modular development of projects and taking initiative.

TECHNICAL PAPERS AND CONFERENCES:

Journals:

- Perspectives on future research directions in green manufacturing for discrete products. Published in **Green Manufacturing Open**. (2023)
- Thermo-mechanical properties prediction of Ni-reinforced Al₂O₃ composites using micro-mechanics based representative volume elements. Published in **Nature Scientific Reports**. (2022)
- Cellular Agriculture: An Outlook on Smart and Resilient Food Agriculture Manufacturing. Published in **ASTM Smart and Sustainable Manufacturing Systems**. (2021)
- Effect of Key Economic Uncertainties on Techno-Economic Performance of Production of High Energy-content Sustainable Aviation Fuels Derived from Ethanol: *Submitted, In Review*
- Quantifying Environmental Uncertainty in Global Bio jet Fuel Production: A Comprehensive Life Cycle Assessment of 1G, 2G, and 3G feedstocks: *In Preparation*
- A Comprehensive Techno-Economic Analysis of a Novel NdFeB Magnet Manufacturing Process: *In Preparation*
- Optimization Design Model for Electric Traction Motors Considering Circular Economy Paradigm: *In Preparation*
- Circular Solutions Framework to Target Problems in Circular Economy: *In Preparation*
- Comparative Life Cycle Assessment of first-generation Ethanol made in Brazil and in Belize: *In Preparation*

Conference Presentations and Papers:

- Microgrid Design Optimization using Genetic Algorithm- Presented at **BIP (Blue Integrated Partnerships) Conference**. *August 2023*
- Comparative Life Cycle Assessment of Bioethanol Production from Different Generation Biomass and Waste Feedstocks- Published in **Procedia CIRP Life Cycle Engineering Conference**. *May 2023*
- Techno-Economic Analysis of Microgrid Deployment in Magueyes, Puerto Rico-Presented at **BIP (Blue Integrated Partnerships) Conference**. *July 2022*
- Climate Change, Mass Migration, and Gender: A non-linear complexity (Phase 1: Problem Definition and Methodology)- Presented in **BIP (Blue Integrated Partnerships) Conference**. *July 2022*
- Climate Change, Mass Migration, and Gender: A non-linear complexity (Phase 2: Application of dimensional analysis and correlation study)-Presented at **APS DFD (American Physical Society Division of Fluid Dynamics) Conference**. *November 2022*

AWARDS AND ACCOLADES:

- Won the **audience choice award in the Purdue New Ventures Start-up competition** for the project on accelerating the path to net-zero renewable diesel with algae feedstock. *April 2023*
- **Won** the overall regional level and the regional category of fossil energy and carbon management in the **DOE & NREL Challenge of Energy Tech University Prize**. Elected as the **national-level finalist** of the challenge. ([EnergyTech University Prize 2022-2023](#)). *February 2023*
- **Won** the regional level of the **DOE & NREL Challenge** in the category of fossil energy and carbon management for the project on Belize biorefinery development. ([EnergyTech University Prize 2021-2022](#): Great Lakes Regional-Team Carbonbusters, Purdue) *February 2022*
- **National-level finalist** in **AES Energy Innovation Challenge** for the decarbonization solution proposed for Belle Glade, Florida. *October 2022*
- Guest speaker: Environmental and Ecological Engineering seminar series at Purdue University. *October 4, 2022*.

LEADERSHIP AND VOLUNTEERING EXPERIENCE:

- **President of Think India Purdue**, an active member of the **leadership team** of Toastmasters Club, SKY at Purdue. Served as **consulate and/or industry connections liaison**. (2018-Present)
- **Senator at the Purdue Graduate Student Government (PGSG)**. Involved in university-level policy decisions as a representative of the department. (2020-Present)
- Working as the **student brand ambassador** for TBI (Technology and Business Incubator).