Pratikshya Mohanty

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EDUCATION

- **Doctor of Philosophy - Dept. of Mechanical Engineering** *Aug. 2022 – June 2026 (expected)*
  The Pennsylvania State University | *GPA 3.78/4* Pennsylvania, USA

  Project title (on-going): 'Multi-wake Interactions in Turbulent Flows and Flames'- funded by *Office of Naval Research, USA* | Dr. Jacqueline O'Connor & Dr. Santosh Hemchandra

  1. Designed and fabricated a CAD-based canonical bluff-body wake rig, managing part design, tolerances, and assembly workflows using **SolidWorks** to support repeatable experimental investigations.
  2. Planned and executed stereo-PIV experiments, including camera-optics configuration, calibration, acquisition, and data quality assurance, enabling reliable time-resolved and statistically converged flow measurements.
  3. Applied spectral (PSD, POD, SPOD, and WPOD) methods for turbulence feature extraction of single and multi-body wake flows, identifying dominant unsteady modes and wake-wake interaction mechanisms relevant to combustor augmentors.
  4. Employed novel information-theoretic network analysis to PIV velocity fields to identify dynamically critical regions governing wake unsteadiness and multi-element coupling, extending conventional turbulence diagnostics, used to validate LES simulation for the bluff-body flows using in-house code.
  5. Assessing the sensitivity of network topology and inferred flow dynamics to PIV post-processing choices, establishing robustness limits for data-driven turbulence characterization in bluff-body flows.
  6. Developing modular **MATLAB** and **Python** workflows and software packages, leveraging agentic AI for code orchestration and workflow validation with **MPI-enabled HPC** integration to support scalability, reproducibility, and deployment of network informatics tools for turbulence analysis.

  Project title (concluded): 'Development and Evaluation of Fuel Flexible Injector using Additive Manufacturing' - funded by *UTSR, The U.S. Department of Energy & Solar Turbines Inc.* | Dr. Jacqueline O'Connor & Dr. Yuan Xuan

  1. Performed large-eddy simulations (LES) of reacting turbulent flows using **Siemens STAR-CCM+**, incorporating flamelet-generated manifold (FGM) chemistry to assess hydrogen-methane fuel blends in an industrial-scale injector.
  2. Conducted cross-validation of reacting flow predictions between **STAR-CCM+** and **ANSYS Fluent** to quantify solver and model-dependent differences in flame topology under elevated pressure operating conditions, prior to flame-transfer-function (FTF) analysis.
  3. Used **Cantera** for parametric study and validation of flame properties as precursor to LES simulations for high-hydrogen blends.
  4. Executed cold-flow simulations and hydrodynamic stability analyses to support adjoint-based structural sensitivity studies for fuel-flexible injector redesign, with high-quality meshing generated using **ANSYS ICEM.**
  5. Performed Reynolds-averaged Navier-Stokes (RANS) simulations of high-hydrogen-content flows to support operability mapping of industrial injectors, accounting for realistic wall roughness effects associated with additively manufactured geometries.
  6. Supported experimental rig testing of additively manufactured injectors, contributing to computational-experimental validation under premixed operating conditions.
  7. Contributed to the development and integration of novel (NURBS) adjoint-based shape optimization workflows for metal additive manufacturing (AM) applications within commercial CFD software (**STAR-CCM+ with Python-based plugins**).

- **Master of Technology in Machine Design and Analysis** *July 2017 – June 2019*
  National Institute of Technology, Rourkela | *CGPA 9.2/10* Odisha, India
  Dissertation title: 'Flexural Vibrations in Al-SiC Functionally Graded Inclined plate due to Accelerating Mass'

- **Bachelor of Technology in Mechanical Engineering** *Jul. 2013 – June 2017*
  National Institute of Technology, Kurukshetra | *CGPA 7.5/10* Haryana, India
  Project title: 'Design Optimization of Universal Joint and Connecting Rod for Two-Stroke IC Engine'

Technical Focus Areas

Network informatics for physics-based modeling • Additive manufacturing • Combustion modeling • Flame dynamics and hydrodynamics • PIV-based flow measurements • Python-based scientific software development • HPC-based simulations.

Work Experience

• **GE Gas Power (now Vernova)** *Aug. 2021 – July 2022*
Combustion Aero-Thermal Engineer Bengaluru, India

◦ Supported thermoacoustic instability analysis and mitigation strategies for DLN 2.6e combustors in H-class heavy-duty gas turbines, integrating test data, analytical assessment, and design insights to improve operability and stability margins.

◦ Executed Commissioning Risk Assessments, Product Characterization, fleet monitoring, and Certification & Design Transfer (C&DT) activities for 9HA gas turbines in Malaysia, China, and the UAE, contributing to performance validation, issue resolution, and operational readiness during field deployment.

◦ Organized technical learning sessions on the hydrogen economy and initiated an internal innovation task force to evaluate carbon capture technologies and their relevance to gas turbine applications.

◦ Served as Chief Editor of the Gas Turbine Engineering monthly newsletter, coordinating technical content and promoting internal knowledge sharing and engineering communication with senior and executive leadership.

• **GE Power** *July 2019 – July 2021*
Edison Engineering Leadership Program Bangalore, India

◦ Completed 32 engineering courses with integrity, 15 quality and management training, and 4 engaging rotations in two years as part of EEDP curricula.

◦ Investigated the spray characteristics for pressure swirlers volume of fluids (VOF) models using **ANSYS FLUENT** of liquid fuel cartridges as part of a cost-out project for F-class HDGTs.

◦ Programmed **Python**-based process tool as a lean effort for atomization characteristics prediction, iterative design, and optimization of pressure swirl atomizers (Woodward atomizers).

◦ Developed auxiliary P&ID schematics and conducted steady-state flow analyses for upstream fuel skid systems of F-class gas turbines, supporting valve sizing, pressure-loss evaluation, and safe operability under design and transient conditions.

◦ Updated **NPSS**-based performance models and carried out Selenium-based automated testing prior to deployment for Aero-derivative GT (LM6000 and LM2500) necessary for commercial bidding and estimation.

◦ Revamped and publicized the Edison Council newsletter to boost readership to 3,000 employees globally, showcasing technological development and conducting spotlight interviews of young engineering talent across GE in 14 monthly issues.

• **BilFinger-Tebodin, LLC** *June 2016 – July 2016*
Pipeline Design Intern Abu Dhabi, UAE

◦ Assessed the design of on-shore tie-in pipelines for sour gas transportation using in-house flow analysis tools and **ANSYS APDL** for structural dynamics analysis.

◦ Gained insight into ASTM/ASME/Shell DP industry standards, coatings, and materials.

◦ Assisted the commercial team in pipe-lay for on-shore and off-shore FEED projects and negotiations.

Skills & Tools

• **CAD & CFD**: Autodesk Fusion 360, SolidWorks, STAR-CCM+, ANSYS,

• **Combustion**: CHEMKIN/Cantera, COMSOL Multiphysics, LaVision DaVis

• **Computer**: MATLAB, Python, Github, Linux, MS Office suite

• **Business Analytics**: ANOVA, Tableau

• **Soft Skills**: Agile/Traditional Project Management, Six Sigma *(toward certification)*

• **Languages**: English, Hindi, Odiya; Spanish *(working proficiency)*, Arabic *(working proficiency)*

Volunteer Experience

- **Student Liaison** *June 2025 | June 2023*
  ASME - IGTI | USA
  ◦ Served as student liaison, driving energy education and outreach on behalf of the Electric Power Committee and Student Activity Committee for ASME Turbo Expo 2025.
  ◦ Served as student liaison supporting activities towards a successful ASME Turbo Expo 2023, Boston.

- **Member** *June 2024 - present*
  ASME - Early Career Engineer Programming Committee | USA
  ◦ Driving proposal and event strategy for ASME-India to expand ECE vision, cohort, and outreach.
  ◦ Currently working with ASME leadership to streamline internal processes in event planning.

Awards and Recognitions

- **Harry G. Miller Fellowship** | *Penn State University* *Dec. 2025*
- **URSSI winter school- Scietific software development** | *Oregon State University* *December 2025*
- **Forward Program** | *McKinsey & Company* *July 2025*
- **Student Advisory Committee Award** | *ASME -IGTI* *June 2025*
- **Student Advisory Committee Award** | *ASME -IGTI* *June 2023*
- **JFWTC Make-a-Thon** | *GE India* *Jan 2022*
- **Impact Award - 9HA.02 MT4A Field commissioning support** | *GE Vernova* *Jan 2021*
- **Impact Award - Chevron El Segundo Support** | *GE Gas Power* *May 2021*

Memberships and Certifications

- **Student Member** | *American Institute of Aeronautics and Astronautics* *May 2025- present*
- **Student Member** | *The Combustion Institute* *February 2021- present*
- **Student Member** | *American Institute of Mechanical Engineers* *May 2018- present*
- **Princeton Combustion Summer School** | *The Combustion Institute* *June 2024, 2021*
- **Computational Combustion using Python and Cantera** | *Skill-Lync* *July 2021*
- **Machine Learning** | *Stanford University (online)* *July 2021*
- **Fundamentals of Project Planning and Management** | *University of Virginia (online)* *July 2020*
- **Virtual Agile** | *International Institute for Learning (online)* *May 2020*

Publications and Presentations

- Mohanty, P., Thazhathattil, V., Karmarkar, A., Hemchandra,S., O'Connor J.,(2026) "Using Information Networks to Understand the Impact of Turbulence on Wake Dynamics", *AIAA SciTech 2026*

- Thazhathattil, V., Mohanty, P., Islam, T., Hemchandra, S., O'Connor J.,(2026) "Critical Regions Driving Unsteady Wake Dynamics in Flow Past Multi-Cylinder Arrays", AIAA SciTech 2026

- Islam, T., Thazhathattil, V., Mohanty, P., Hemchandra,S., O'Connor J., (2026) "Prediction and Measurement of the Dynamics of Multi-Element Wake Flows", *AIAA SciTech 2026*

- Mohanty, P., Birbeck, C., Jalui S., Rodriguez,J., Manogharan,G., Xuan Y., O'Connor J., (*under review*) "Impact of Surface Roughness in an Additively Manufactured Fuel Injector on Flame Stability Limits", *Journal of Propulsion and Power*

- Jalui S., Rodriguez,J., Tang, R., Mohanty, P.,Overdorff, R., Xuan Y., O'Connor J., Manogharan,G., (*on-going*) "Advancing AM Workflow for Fuel Injectors in Gas Turbines: Role of DfAM and Fuel Flexibility ", *Additive Manufacturing*

- Mohanty, P., Gupta, S., Hemachandra S., Xuan Y., O'Connor J.,(2025) "Impact of a Central Pilot Jet on the Stability of a Swirling Flow", *ASME Turbo Expo 2025*

- Mohanty, P., Jalui, S., Manogharan, G., Xuan Y., O'Connor J., (2024) "Flashback Characterization of Additively Manufactured Swirl-Stabilized Fuel Injector with Varying Surface Roughness", *Eastern States Section of The Combustion Institute*

- Mohanty, P. Gupta, S., Hemachandra S., Xuan Y., O'Connor J., (2023) "Impact of a Central Pilot Jet on the Stability of a Swirling Flow", *Student Poster - ASME Turbo Expo*

- Guest Speaker for the Webinar (2022), "Emerging Trends in Global Energy Market", *ASME-VIT - Office of Students' Welfare*.

- Mohanty, P., (2021) "Chapter 6: Additive Manufacturing and Optimization in Industry 4.0", *Advanced Manufacturing: Progress, Trends, and Challenges*. Nova Publication, December 2020, ISBN: 978-1-53618-870-7

- Mohanty, P., Behera R.K. (2020) "Dynamic Response of FGM Kirchhoff's Plate", *Advances in Applied Mechanical Engineering- Lecture Notes in Mechanical Engineering*. Springer, Singapore.

- Mohanty, P., (2017) "Design and Finite Element Analysis of a Deep Groove Ball Bearing", *International Journal of Emerging Technologies and Innovative Research*, ISSN:2349-5162, Vol.5, Issue 11, page no.593-599

REFERENCES

Scan to email my CV -

1. **Dr. Jacqueline O'Connor**
   Professor, Department of Mechanical Engineering
   Penn State University, PA, USA
   Email: jxo22@psu.edu
   Relationship: Ph.D. Thesis Advisor

2. **David (Bobby) Noble**
   Senior Program Manager, Gas Turbine R&D
   Electric Power Research Institute, NC, USA
   Email: bnoble@epri.com
   Relationship: ASME IGTI Committee Member

3. **Jayaprakash Natarajan**
   Senior Engineer, System Engineering
   GE Vernova, Greenville, SC, USA
   Email: JP.natarajan@ge.com
   Relationship: Former Engineering Supervisor (Combustion Systems)

4. **Debasish (Deb) Rath**
   Engineering Manager (ITR Leader), Core Gas Upgrades, Asia, Middle East & Africa
   GE Vernova, Bengaluru, KA, INDIA
   Email: debasish.rath@ge.com
   Relationship: Former Technical Supervisor (Performance Engineering)