

Manu Aryal

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RESEARCH INTERESTS

Computational aeroelasticity, fluid–structure interaction (FSI), bio-inspired aerodynamics, machine-learning-driven structural health monitoring, and renewable energy system optimisation. Experienced in coupled multi-physics solvers (OpenFOAM/CalculiX/preCICE), Bayesian optimisation frameworks, and data-driven approaches to mechanical fault detection.

EDUCATION

MSc in Renewable Energy Engineering 2024 – 2026
Tribhuvan University, IOE Pulchowk Campus, Nepal

- Percentage: 90.83 % | Faculty Rank: 1st of 20
- Merit Scholarship awarded by IOE based on national entrance examination
- Thesis: *Vibrational Data and Machine-Learning-Based Multi-Bolt Looseness Levels Classification*

Bachelor of Engineering in Mechanical Engineering 2018 – 2023
Tribhuvan University, IOE Eastern Region Campus, Nepal

- Percentage: 83.06 % | Faculty Rank: 1st of 96
- Merit Scholarship awarded by IOE based on national entrance examination
- Final Year Project: *Modelling and Simulation of Turbine Blade and Study of Tip Leakage Flow on Different Tip Profiles and Casing Contouring*

PUBLICATIONS & CONFERENCES

Aryal, M., Motra, M., & Luintel, M. C. (2026). “A Comparative Study on Acoustic Fault Detection in Bolted Structures.” *Journal of Innovations in Engineering Education*.
Journal Article: Accepted Manuscript 2026

Aryal, M., Motra, M., & Luintel, M. C. (2026). “Comparative Analysis of MFCC and PSD Features for Multi-Bolt Preload Classification under Noise Conditions.” Presented at the 18th IOE Graduate Conference, Pulchowk Campus, Tribhuvan University, Nepal.
Conference Proceedings May 2026

Shrestha, C. G., & **Aryal, M.** (2026). “Topology Optimisation with Generative Design on Albatross-Inspired Wing.” *Aerotecnica Missili & Spazio*.
Journal Article Feb 2026

Aryal, M., De, M. M., & Bose, C. (2025). “Aerodynamics of Bio-Inspired Vertical Axis Wind Turbine Rotors.” Presented at the 52nd National and 11th International Conference on Fluid Mechanics and Fluid Power (FMFP), Nirma University, India.
Conference Proceedings Dec 2025

Aryal, M., De, M. M., & Bose, C. (2025). “3D Numerical Investigation of Bio-Inspired Vertical Axis Wind Turbine Rotor using AMI.” Published OpenFOAM Case Study, FOSSEE, IIT Bombay. [[Case](#)

RESEARCH EXPERIENCE

Researcher: BioFSI Lab (Remote Collaboration)

Aug 2025 – Present

University of Birmingham, United Kingdom

- Conducting aeroelastic optimisation of bio-inspired wing geometries using Bayesian-integrated FSI coupling (OpenFOAM + CalculiX via preCICE) under transient gust loading conditions.
- Investigating drag-reduction mechanisms derived from Peregrine Falcon wing morphology for adaptive flight surface design.

Semester-Long Research Intern (Remote)

Feb 2025 – Aug 2025

FOSSEE, IIT Bombay, India

- Developed and analysed a seedpod-inspired VAWT rotor geometry using OpenFOAM (Arbitrary Mesh Interface method).
- Demonstrated rotor suitability for low-wind-speed urban energy applications; presented results at FMFP 2025 (Ahmedabad, India).

Research Assistant

Apr 2024 – Jul 2024

Centre of Infrastructure Development Studies (CIDS), Nepal

- Evaluated waste-heat-recovery potential across 9 cement industries through on-site audits and thermodynamic energy–exergy analysis.
- Developed CFD and thermal models (ANSYS, DWSIM) to simulate heat-exchanger effectiveness for industrial-scale power generation from flue gases.

INDUSTRY EXPERIENCE

CAE Engineer

Aug 2024 – Present

Yatri Motorcycles, Kathmandu, Nepal

- Validated coupled CFD–FEA models against experimental track data for electric two-wheeler development, focusing on aerodynamic drag, thermal management, and structural fatigue life prediction.
- Performed topology optimisation and simulation-driven design iterations, achieving significant weight reduction while maintaining all structural safety factors.

Mechanical Engineer, Propulsion

Jul 2023 – Mar 2024

Voyager Mayeen, Nepal

- Designed mission profile and flight trajectory for a sub-orbital rocket; performed thrust-to-weight and fuel-requirement optimisations using MATLAB and Python.
- Executed aerodynamic simulations (ANSYS) to determine stable flight configurations, validating fairing and fin geometries for supersonic flight regimes.

TECHNICAL SKILLS

Simulation	OpenFOAM, ANSYS Fluent/Mechanical, CalculiX, preCICE, DWSIM, HomerPro
Methods	FSI, CFD (RANS/URANS), FEA (Static, Modal, Transient Dynamic), MBD, Topology & Bayesian Optimisation
Programming	Python (NumPy, Pandas, Scikit-learn), MATLAB, Bash/Shell Scripting
Pre/Post	Hyperworks, ParaView, Gmsh, nCode DesignLife
Languages	Fluent in English, Nepali, and Hindi

AWARDS & ACHIEVEMENTS

- **The Fatigue Limit Award:** Yatri Design Studio Awards 2026 for Outstanding Professionals 2026
- **ARCHER2 Image & Video Competition:** Selected Video Submission: “Wake Dynamics of Bio-Inspired VAWT Rotors” 2025
- **Guest Lecturer:** Rocket Propulsion Technology, School of Electronics & Mechanical Engineering, Nepal Army 2023
- **Mech Camp 2.0: 3D Modelling Competition:** Winner (Twin-Screw Compressor) 2023
- **SOMES Achievement Award:** for scoring 90.22 % in BME 7th Semester 2022

TEACHING EXPERIENCE

Higher Secondary Science Teacher
Samata Shiksha Niketan, Lalitpur, Nepal

Apr 2023 – Jul 2023

COMMUNITY SERVICE

- **President**, Rotaract Club of Rajdhani, Kathmandu Jul 2026 – Present
- **Secretary**, Rotaract Club of Rajdhani, Kathmandu Jul 2025 – Jun 2026
- **Treasurer**, Rotaract Club of Rajdhani, Kathmandu Jul 2024 – Jun 2025
- **Joint Secretary**, Rotaract Club of Rajdhani, Kathmandu Jul 2023 – Jun 2024
- **PR Manager / Tutor**,
Society of Mechanical Engineering Students (SOMES), Dharan Mar 2021 – Apr 2022