Ashutosh Dev

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Education

Master of Science in Renewable Energy Systems **Jan 2025 – Present**

Current CGPA: 3.8/4 (A Grade)

Faculty of Engineering, Victoria University of Wellington, Wellington, New Zealand

New Zealand Awards Recipient (Manaaki New Zealand Scholarships), fully funded master's study.

Major courses: Renewable Energy Systems Generation; Advanced Development of Renewable Systems; Advanced Power Electronics; Sustainability Modelling; Energy Modelling; Physical Basis and Impacts of Climate Change; Machine Learning Applications; Development Studies; Applications of GIS; Research Thesis.

Bachelor of Mechanical Engineering (Specialization in Energy Technology) **Aug 2019 - May 2024**

CGPA: 3.38/4

Department of Mechanical Engineering, School of Engineering, Kathmandu University, Dhulikhel, Nepal

Major courses: Thermodynamics; Heat Transfer; Fluid Mechanics; Hydraulics; Turbomachinery; Renewable Energy; Solar Energy Engineering; Refrigeration and Air Conditioning; Numerical Methods; Differential Equations; Materials Science; Production Control; Machine Design; Entrepreneurship

Publications

- Dev, A., Brent, A., Thapa, G.B., (2025). A Multi-Method Review of Hybrid Renewable Energy Systems (HRES) in Climate-Vulnerable Communities: Integrating Bibliometrics, LCOE Meta-Analysis, and Modelling Synthesis. Global Energy Interconnection (Status: Accepted-In press)
- Dev, A., Amatya, S., Dumre, Y., Shah, S., & Baral, B. (2024). Exploring Aluminum as a Solid Thermal Storage Medium for Solar Cooking: Experimental Investigation Coupled with Numerical Modeling using OpenFOAM. Heliyon (Engineering). doi: 10.1016/j.heliyon. 2024.e39855
- Dev, A., & Singh Bhattarai, B. (2023). Numerical Modelling and Analysis of Photovoltaic-Thermal Liquid Collector Using OpenFOAM. American Journal of Modern Energy, 9(4). doi: 10.11648/j.ajme.20230904.11
- Pandey, B. P., Ghimire, R., Sapkota, N., & Dev, A. (2023). Numerical Investigation of Compatibility of Synthetic Natural Gas with Conventional Liquefied Petroleum Gas Burners. Journal of Physics: Conference Series, 2629(1), 012031. doi:10.1088/1742-6596/2629/1/012031

Research and Papers Under progress

- Dev, A., Brent, A., Chowdary, A., Rayudu, R., (2026). Digital-Twin Surrogate and Genetic Algorithm Optimization of a Dual-Source Geothermal ORC: NCG (CO_2) Effects and Optimal Split-Ratio Strategy. Applied Energy (Status: Peer Review)
- Dev, A., Brent, A., Thapa, G.B., (2026). System Dynamics Modelling of the Sustainable Electric Mobility Transition in Nepal: Coupling Grid Seasonality, Systemic Constraints and Endogenous Policy Feedback within a Bifurcated Transport Fleet. Energy for Sustainable Development (Status: Revision post peer review)
- Dev, A., Nguyen, B, Brent, A., Renwick, J (2026). Interpretable Symbolic Models of HKH Glacier Thickness and Velocity from Climate Forcing Using Time-Series Genetic Programming. Environmental Modelling & Software (Status: Submitted for Review)

Professional Experience

Teaching and Research Assistant, Faculty of Engineering, Victoria University of Wellington, Wellington, New Zealand **May 2025 - Jan 2026**

- Delivered tutorials and teaching support for undergraduate courses in Mechanics, Thermodynamics, Engineering Research, and Project Management.
- Research involvement in Dual-Source Geothermal ORC: NCG (CO_2) effects and optimal split-ratio strategy using a digital twin approach.
- Used sustainability modelling tools to produce and validate ongoing research, including Vensim for dynamic electric grid modelling.
- Supported faculty research activities and assisted with technical reporting and reproducible analysis workflows.

Project Engineer, People, Energy & Environment Development Association (PEEDA), Kathmandu, Nepal **May 2024 - Jan 2025**

- Applied fire safety engineering using FDS and PyroSim to simulate fire dynamics and smoke propagation from biomass combustion in residential settings.
- Contributed to an electric cookstove project reaching more than 1,000 households, plus solar pumping, solar storage, and micro-hydropower condition monitoring using PVsyst and Homer Pro.
- Contributed to municipal energy planning and renewable energy design, implementation monitoring, and stakeholder-facing technical reporting supporting more than 1,800 households.

Research Assistant, Energy Systems & Technology Research Lab, Kathmandu University, Nepal **Dec 2023 - May 2024**

- Reviewed and characterized thermal energy storage pathways for residential heating, including sensible, latent (PCM), and thermochemical (salt hydrate) systems.
- Conducted combustion and flame propagation modelling of premixed H2/CH4 mixtures using OpenFOAM; tested solver configurations and compared against reference data (Sandia Flame D).
- Produced technical documentation and supported lab mentoring and project reporting.

CFD Research Intern (FOSSEE Internship), Indian Institute of Technology Bombay, India **Dec 2022 - Feb 2023**

- Executed OpenFOAM workflows including geometry import, meshing (blockMesh, snappyHexMesh), and multiphase simulations (interFoam, multiphaseEulerFoam).
- Prepared technical reports describing modelling setup, assumptions, and simulation outputs.

Selected Research Projects and Engagements

ORC Digital Twin and Optimization (DWSIM, ensemble learning, genetic algorithms)

- Built a DWSIM-based digital twin of an Organic Rankine Cycle and quantified performance impacts of non-condensable gases (CO_2) across operating scenarios.
- Generated a training dataset from parametric simulation runs and trained ensemble-learning surrogates to approximate key outputs and constraints.
- Optimised the digital twin using genetic algorithms, applying Differential Evolution for global search and Powell's method for local refinement.

- Developed a reproducible Python workflow for data generation, surrogate training, optimisation, and scenario post-processing.

Agent-Based Modelling for Energy Migration Analysis (HKH region)

- Built an agent-based modelling framework to analyse energy choice and migration dynamics under resource, climate, and policy constraints in the HKH region.
- Encoded agent decision rules and scenario levers (e.g., energy access, income shocks, policy incentives) to explore system-level outcomes.
- Conducted scenario experiments and sensitivity analysis to identify key drivers and tipping conditions influencing migration and energy transitions.

Volunteer Researcher, Beyond Zero Emissions Australia (Clean energy supply chains)

- Researched green commodities (iron, steel, aluminium, ammonia, hydrogen), green products (batteries, solar, wind), and critical cleantech materials supporting the clean energy transition.
- I identified and screened mines and material supply pathways and produced operational knowledge product synthesizing evidence for decision-making.

Technical Skills

Programming: Python; Java; RStudio; TensorFlow; Keras; Linux

Simulation and Modelling: OpenFOAM; DWSIM; ANSYS Workbench; FDS; PyroSim; PVsyst; Homer Pro; RETScreen; CROPWAT; Vensim; openLCA

Methods: CFD (combustion, multiphase); model calibration and validation; sensitivity analysis; surrogate modelling (ensemble methods); optimization (genetic algorithms); agent-based modelling.

Awards and Scholarships

- New Zealand Awards Scholarship (Manaaki New Zealand Scholarships), fully funded MSc study.
- Research Equipment Scholarship (Prof. Dr. Peter V. Schwartz, California Polytechnic State University) for final-year thesis.
- Millennium Campus Fellowship Award (Millennium Campus Network).
- Academic Scholarship (Semesters IV and VIII), Kathmandu University.
- Best Trainer Award, Scientific Writing Workshop (SEDS-KU, 2023).

Conference Presentations

Selected talks/posters: National Conference on Waste Management and Circular Economy (Nepal, 2024) – poster on e-cooking repair and circular economy; University Scholar Conference (Kathmandu University, 2023) – oral presentations on OpenFOAM flare combustion and aluminium thermal storage; CRHT-XI (2023) – oral presentation on SNG compatibility with LPG burners; University Conference (2022) – oral presentation on cleaner and safer propellant materials.

Leadership and Service

- Research Coordinator, SEDS-KU (Students for the Exploration and Development of Space, Kathmandu University), 2020-2021.
- Volunteer, Amnesty International Nepal (2020).
- Mechathon Organizer, AAVISHKAR 19 (Kathmandu University Robotics Club, 2019).
- Training participant: Renewable Energy for Climate Actions and Building Resilience (ICIMOD; funded by DFAT Australia, 2022); Advancement in Turbine and Hydropower Technologies (ATHT IV, 2021).