Sandip Gautam

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Education

University of New Hampshire, Durham, NH, USA Aug 2024 — Ongoing
Master of Science in Mechanical Engineering

Tribhuvan University, Institute of Engineering, Pulchowk Campus Nov 2018 — Apr 2023
Bachelor of Engineering in Aerospace Engineering

Research Experience

Graduate Research Assistant, University of New Hampshire Aug 2024 – Present

- **Project**: *Vortex-Surface Interactions in Unsteady and Gusting Environments*
- **Funding**: Air Force Office of Scientific Research (AFOSR), Award No. FA9550-24-1-0211
- Conducting fluid dynamics experiments in an open-channel recirculating flume to investigate vortex behavior
- Capturing and analyzing free-surface elevation maps, thermal fields, and surface-parallel velocity data
- Performing particle image velocimetry (PIV) to examine sub-surface vortex dynamics
- Correlating surface signatures with vortex structures to characterize primary and secondary vortices
- Collaborating with interdisciplinary teams; managing timelines, documentation, and progress presentations
- **Skills Gained**: Data analysis, PIV, image processing, programming, teamwork, time management

Advisor: Dr. Tracy Mandel, Ocean Hydrodynamics Lab

Bachelor Thesis Jun 2022 — Mar 2023

Fabrication of Particle Image Velocimetry Setup for Experimentation at Low Reynolds Number

- Designed and built a functional towing tank for PIV measurements, equipped with a load cell to acquire accurate lift data for validating PIV results.
- Executed particle image velocimetry measurements on a flat plate at a Reynolds number of 6040. This involved creating a Python program for dynamic airfoil masking and image processing using PIVlab.
- Conducted CFD simulations of a flat plate to study the laminar separation bubble, closely replicating experimental conditions in Ansys Fluent.
- Performed a qualitative analysis of error sources in a cost-effective particle image velocimetry setup.
- **Skills Developed**: Python, OpenPIV, PIVlab, Ansys (Structural, Fluent), LabView, CATIA.

Supervisors: Asst. Prof. Neeraj Adhikari and Asst. Prof. Kamal Darlami

Volunteering and Work Experience

Research Intern, Antarikchya Pratisthan Nepal Oct 2022 — Dec 2022

- Conducted an extensive literature review on CubeSat testing, thermal vacuum chamber, and its feasibility in Nepal.
- Performed preliminary design and analysis (structural and thermal) of the thermal vacuum chamber for testing of 6U CubeSats.
- Produced detailed reports and presentations on research findings.
- Presented a poster on the thermal vacuum chamber at the International Space Day, held at Nepal Academy of Science and Technology (NAST).
- **Skills Developed**: Ansys Structural & Thermal Analysis, CATIA

Committee Member, SEDS Pulchowk 2020 - 2021

- Contributed to seamlessly organizing various space sciences programs in the Pulchowk Campus.

Volunteer, The Tenth National Mechanical Engineering Expo Jan 2020

- Assisted the organizing committee in successfully organizing a water rocket competition for secondary-level students.

Academic Projects

Bijuli, a powerline inspection fixed wing battery powered UAV Jun 2022 — Jan 2023

- Designed Bijuli, a fixed-wing battery-powered UAV for power line inspection in Nepal.
- Conducted static and dynamic stability analysis to ensure safe and reliable flight performance.
- Presented poster detailing UAV design and capabilities.
- **Skills Developed**: XFLR5, X-Plane, Python

Analysis of two-dimensional heat conduction using finite element method in MATLAB Mar 2022 — Apr 2022

- Enhanced the provided MATLAB code with additional functionalities including the simulation of internal heat sources, defined on a node-by-node basis, and the capability to calculate and display temperatures along with reactive heat fluxes.
- Simulation and analysis of various standard problems with the modified code.

Aerodynamic design and analysis of low mass flow rate subsonic single stage axial flow compressor Aug 2021 — Nov 2021

- Gained hands-on experience in compressor design, utilizing CATIA V5 for blade design and Ansys TurboGrid for meshing the compressor stage.
- Conducted in-depth analysis of the compressor's performance using Ansys CFX.
- Prepared a comprehensive and detailed research report.

Familiarization with the DAQ system and acquiring data for lift and drag in a NACA 0012 airfoil Jan 2021 — Feb 2021

- Designed a setup using a load cell, LabVIEW, and NI DAQmx for lift and drag data acquisition of an airfoil in a subsonic wind tunnel.
- Performed CFD simulation of an airfoil in Ansys and compared the CFD results with experimental data.

Designing trolley for aircraft's exhaust stack tube pipes 2020

- Carried out a trolley design to facilitate the exhaust stack pipe's safe-keeping and efficient mobility.
- Performed structural and ergonomics analysis using CATIA V5.

Design and fabrication of a quadcopter 2020

- Built a quadcopter using an Arduino Uno microcontroller to demonstrate at MechTRIX-X.
- Implemented a proportional, integral, and derivative (PID) control for roll and pitch stabilization.

Skills

Programming Languages:

Python, Fortran, C, MATLAB

Software:

CATIA, Solidworks, Ansys(Fluent, Structural, CFX), OpenFOAM, LabVIEW, Microsoft Office Packages

Soft Skills:

Problem Solving, Team Work, Time Management, Flexibility

Others:

Control System Design (PIV, LQG, and LQR), LaTeX

Test Scores:

GRE: 320 (Quant: 167, Verbal: 153, AWA: 3.5) (Taken on Oct 12,2023)
TOEFL: 103 (Reading: 29, Listening: 29, Writing: 22, Speaking: 23) (Taken on Dec 02,2023)

Conference Presentations

1. Gautam, S., Mandel, T., Nelson, D., & Morris, S. (2025). *Free-surface signatures of counter-rotating vortex pairs in the ocean*. Poster presented at the School of Marine Science & Ocean Engineering Graduate Research Symposium, University of New Hampshire, March 12, 2025.

References

References available upon request