

BIMAL BHATTARAI

UAV Dynamics and Control | Trustworthy Aerospace Autonomy | Safety-Critical Flight Systems

Kathmandu, Nepal | bimalbhattarai@outlook.com | +977-9861855995

bimalbhattarai.com.np

RESEARCH PROFILE

Mechanical engineer and UAV researcher with experience in rotorcraft payload dynamics, Pixhawk-based flight experimentation, UAV sensing and field deployment, aircraft maintenance and aviation safety/quality assurance. Looking for PhD research opportunities in safety-assured aerial autonomy, with particular interest in uncertainty-aware guidance and control, model predictive control, risk-aware planning, safe learning-enabled control, runtime assurance, and experimental validation on UAV platforms.

EDUCATION

M.S. in Mechanical System Design and Engineering — Distinction

Aug 2023

Pulchowk Campus, Institute of Engineering, Tribhuvan University

Lalitpur, Nepal

- Thesis: *Experimental Evaluation of Payload Induced Oscillations of an Unmanned Rotorcraft System*.
- Designed and conducted experiments using a **Pixhawk 4-controlled S500 quadrotor with a suspended/tethered payload** to characterize payload-induced oscillatory behavior and its implications for UAV dynamics and control.
- Research output: VETOMAC 2022 conference proceeding; recipient of an M.Sc. Dissertation Grant from the Nepal Academy of Science and Technology (NAST).

B.E. in Mechanical Engineering — Distinction

Nov 2015

Pulchowk Campus, Institute of Engineering, Tribhuvan University

Lalitpur, Nepal

- Full competitive entrance scholarship; relevant coursework included control systems, numerical methods, vibrations, flight dynamics, avionics, aerodynamics, fluid dynamics, and thermofluids.
- Undergraduate thesis combined CFD and experiments to study passive heat-transfer enhancement in a concentric-tube heat exchanger.

SELECTED UAV & RESEARCH EXPERIENCE

Research & Grant Lead, Research Center of Low Altitude Economy (RCLAE)

2025–Present

UAV Systems Development and Research

Nepal

- Co-lead development of a modular, high-altitude cargo UAS concept for Himalayan logistics, medical delivery, and search-and-rescue missions; translate mission needs into airframe, propulsion, avionics, payload, maintainability, and verification requirements.
- Guide a multidisciplinary team of seven engineering students in system architecture, subsystem development, prototyping, and risk-based testing; RCLAE was selected among seven Nepal-based drone ventures/organizations for the Drone Ecosystem Accelerator Program.
- Current technical development: **PX4 SITL, Gazebo, QGroundControl, and ROS 2**, progressing to Pixhawk-based hardware-in-the-loop and experimental flight validation.

Young Scientist Research Grant — UAV Precision Irrigation

2023–2025

Nepal Academy of Science and Technology (NAST)

Nawalparasi East, Nepal

- Developed and field-tested a UAV crop-monitoring workflow integrating RGB and thermal sensing, photogrammetry, and geospatial analysis for precision irrigation; contributed to sensor integration, experimental planning, aerial data collection, and data interpretation.

Kathmandu Metropolitan Research Fellowship — UAV Mapping & GIS

2024

Kathmandu Metropolitan City

Kathmandu, Nepal

- Led high-resolution UAV mapping and GIS analysis for rooftop-area assessment using mission planning, aerial imagery, photogrammetric reconstruction, and spatial classification.

PROFESSIONAL AVIATION EXPERIENCE

Senior Technical Officer, Nepal Airlines Corporation

Dec 2018–Present

Aircraft Maintenance, Maintenance Support, and Aviation Quality

Kathmandu, Nepal

- **Quality Engineer / Auditor (Mar 2023–Present):** conduct risk-based audits, surveillance, and inspections of

maintenance and continuing-airworthiness activities; investigate non-conformities and safety findings using root-cause analysis and monitor corrective/preventive actions.

- **In-Charge, Aircraft Support Shop (Dec 2020–Mar 2023):** led a ten-person technical team responsible for scheduled and unscheduled maintenance of aircraft-support equipment; developed maintenance schedules, inspection checklists, job orders, and equipment records.
- Contributed to safety-assurance activities including hazard identification, safety-risk assessment, risk-control monitoring, and management of change.
- **Aircraft Maintenance (Dec 2018–Dec 2020):** supported inspections, scheduled maintenance, component replacement, documentation, and conformity checks on DHC-6 Twin Otter, Airbus A320, and A330 aircraft.

TECHNICAL SKILLS

Autonomy / UAV: Pixhawk 4; PX4 SITL; Gazebo; QGroundControl; ROS 2 integration (developing); UAV mission planning; flight experimentation.

Programming / Computing: Python; MATLAB; C; Linux; Git; numerical modeling; data analysis; scientific computing.

Navigation / Sensing: GNSS fundamentals; IMU/autopilot integration; RGB and thermal imaging; photogrammetry; sensor-data interpretation.

Machine Learning: Foundational deep learning and computer vision; Neuromatch Academy Interactive Deep Learning Track (128 hours).

Modeling / Engineering: SolidWorks; CATIA; AutoCAD; ANSYS; CFD; meshless methods; mechanical system design and prototyping.

Aviation Safety / Assurance: Aircraft maintenance; airworthiness oversight; internal audit; root-cause analysis; corrective actions; safety-risk assessment; maintenance planning.

PUBLICATIONS & CONFERENCE PROCEEDINGS

- **Bhattacharai, B.**, Rimal, B., Karki, A., Bhattacharai, S. (2022). “Experimental Evaluation of Payload Induced Oscillations of an Unmanned Rotorcraft System.” *Proceedings of VETOMAC 2022*, Vol. 17.
- Acharya, S., **Bhattacharai, B.**, et al. (2021). “Heat Transfer Enhancement of Concentric Heat Exchanger Using Compound Techniques.” *International Journal for Research in Applied Science & Engineering Technology*, 9(II), 125–133.
- Acharya, S., et al., **Bhattacharai, B.** (2021). “An Experimental and Simulation Study on Heat Transfer Enhancement in a Smooth Tube Using Twisted Tape Insert.” *International Research Journal of Modernization in Engineering Technology and Science*, 3(1), 1202–1211.
- Acharya, S., et al., **Bhattacharai, B.** (2021). “Study on Effects of Grooves on Tube Heat Exchangers.” *International Journal of Creative Research Thoughts*, 9(2), 299–306.

SELECTED HONORS, FUNDING & TRAINING

- **Young Scientist Research Grant**, NAST — UAV-based precision irrigation research (2023).
- **M.Sc. Dissertation Grant**, NAST — rotorcraft payload-oscillation research (2023).
- **Kathmandu Metropolitan Research Fellowship** — UAV mapping and GIS research (2024).
- **Drone Ecosystem Accelerator Program** — RCLAE selected among seven Nepal-based drone ventures/organizations (2025).
- Full competitive scholarships for both M.S. and B.E. study at Tribhuvan University; ranked first in the Nepal Airlines Senior Technical Officer competitive examination.
- Selected training: Global Navigation Satellite Systems (2025); Neuromatch Academy Interactive Deep Learning Track (128 hours, 2025); Stanford Code in Place — Python (2025); IATA Aviation Internal Auditor Training (2023).