

SIDDHARTH SHARMA

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Publications

Peer-Reviewed Journal Articles

- Daniel Lieder, **Siddharth Sharma**, Patrick Kirchen, Steven Rogak, and Jan Goeing, “Development of a validated chemical reactor network model for non-CO₂ emissions in RQL aircraft combustors,” GTP-26-1516, *Journal of Engineering for Gas Turbines and Power*. Accepted for publication.

Conference Papers

- Daniel Lieder, **Siddharth Sharma**, Patrick Kirchen, Steven Rogak, and Jan Goeing, “Development of a Validated Chemical Reactor Network Model for Non-CO₂ Emissions in RQL Aircraft Combustors,” GT2026-177253, *Proceedings of ASME Turbo Expo 2026*. In Proceedings, Recommended for journal publication.
- **Siddharth Sharma**, Daniel Lieder, Simone Saini, Anand Kumar, Patrick Kirchen, Jan Goeing, and Steven Rogak (2026), “A micro-turbojet test rig to analyze the impact of jet fuels on emissions and performance,” in *33rd Annual Conference of the Computational Fluid Dynamics Society of Canada*, Canadian Society of Mechanical Engineers. Accepted for publication in the conference proceedings.
- Daniel Lieder, **Siddharth Sharma**, Henna Lintusaari, Nishan Sapkota, Anand Kumar, Patrick Kirchen, Jens Friedrichs, Steven Rogak, and Jan Goeing (2026), “Measurement and Prediction of Particle Emissions from a Micro Turbojet using Conventional and Alternative Jet Fuel,” GPPS-TC-2026-102, *Proceedings of GPPS Montreal26*. In proceedings. DOI: [10.33737/gpps26-tc-102](https://doi.org/10.33737/gpps26-tc-102).

Non-Archival Conference Papers

- **Siddharth Sharma**, Daniel Lieder, Nishan Sapkota, Henna Lintusaari, Anand Kumar, Patrick Kirchen, Jan Goeing, and Steven Rogak, “Experimental and Model Characterization of Jet Fuel Emissions in a Micro-Turbojet Engine,” in *Proceedings of Combustion Institute – Canadian Section Spring Technical Meeting*, Concordia University, May 11–14, 2026. Non-archival; in proceedings.

Conference Posters

- Henna Lintusaari, **Siddharth Sharma**, Nishan Sapkota, Cameron Varcoe, Anand Kumar, Patrick Kirchen, Steven Rogak, and Jan Goeing, “Laboratory-Scale Jet Engine Emission Measurements using a Micro Turbojet with Conventional and Alternative Jet Fuel,” *29th ETH-Nanoparticles Conference (NPC-2026)*, May 31–June 3, 2026, ETH Zurich, Switzerland. Poster presentation.
- **Siddharth Sharma**, Tully Underhill, Nishan Sapkota, Henna Lintusaari, Patrick Kirchen, Jan Goeing, and Steven Rogak, “A Micro-Turbojet Test Facility for Fuel-Specific Performance Evaluation of Alternative Aviation Fuels,” *Proceedings of the ASME 2026 International Mechanical Engineering Congress and Exposition, IMECE2026*, November 8–12, 2026, Vancouver, British Columbia, Canada. Accepted for Poster Presentation.
- Lin Zhang, Oren Han, **Siddharth Sharma**, Heming Yuan, Dylan Noh, and Matthew McEachern, “HVAC Design Calculations for a Medical Office Building in Manchester, England,” poster presented at the 2026 ASHRAE Winter Conference, Las Vegas, Nevada, January 31–February 4, 2026; the UBC team received the Rising Star Award in the HVAC Design Calculations category of the 2025 ASHRAE Student Design Competition.

Education

University Of British Columbia

Sep. 2025 – May 2027

Master of Applied Science in Mechanical Engineering, Specialization Energy and Environment

Vancouver, BC

- GPA: 3.95/4.33
- Supervisor: Dr. Steven Rogak
- **Research area:** Sustainable aviation propulsion, gas-turbine emissions, and experimental thermofluids

University Of British Columbia

Sep. 2023 – May 2025

Bachelor of Applied Science in Mechanical Engineering

Vancouver, BC

Camosun College

Sep. 2022 – May 2023

Advanced Mechanical Engineering Technologist Diploma

Victoria, BC

Southern Alberta Institute of Technology

Sep. 2020 – Aug. 2022

Mechanical Engineering Technologist Diploma (Major in Design and Analysis)

Calgary, AB

- Awards: Honors Society (2021/2022), Jason Lang Scholarship

Research Interests

- **Fuel–Turbulence–Chemistry Coupling in Aircraft Combustors:** Investigating how alternative-fuel properties and combustor design influence turbulent mixing, residence time, flame structure, and the formation of NO_x , soot/nvPM, CO, and unburned hydrocarbons through combined experiments and reacting-flow modelling.
- **Combustor-Exit Flow and Turbine Aerothermodynamics:** Studying how combustor-exit turbulence, hot streaks, dilution wakes, and thermal and compositional non-uniformities affect turbine boundary layers, secondary flows, aerodynamic loss, heat transfer, cooling demand, and stage efficiency using measured inlet conditions and coupled computational modelling.
- **Multiscale Validation and Environmental Assessment of Sustainable Aviation Propulsion:** Transferring fuel-, combustor-, and turbine-dependent effects from laboratory combustors and micro-turbojets to full-scale engines to quantify trade-offs among fuel consumption, operability, efficiency, gaseous and particulate emissions, contrail-relevant aerosols, and mission-level environmental impact.

Research Experience

Undergraduate Research Assistant – Micro-Turbojet Facility Development May 2025 – Aug. 2025

UBC Clean Energy Research Centre

Vancouver, BC

- Commissioned the original instrumented JetCat P200-SX research facility, integrating engine telemetry, thermodynamic/performance measurements, and an initial exhaust system to establish repeatable operation.
- Integrated an ECOM J2KN Pro on the undiluted exhaust path plus a dedicated 2B Technologies NO_x , Teledyne API T300U CO, and LI-COR LI-850 CO_2 analyser chain; coordinated Jet A-1 and FT-SPK fuel procurement through the TU Braunschweig collaboration.
- Verified test-cell ventilation and CO-alarm response, designed the initial exhaust ducting, and wrote the first engine-test SOP, leaving an operational, documented baseline for later emissions campaigns.

Graduate Research Assistant: Sustainable Aviation Fuels, Engine Emissions, and Model Validation Sep. 2025 – Present

UBC Clean Energy Research Centre

Vancouver, BC

- **Gaseous emissions and CRN validation:** Collected JetCat P200-SX thermodynamic and emissions data, including total pressures and temperatures, thrust, spool speed, fuel flow, CO_2 , CO, and NO_x , for an RQL chemical reactor network. The model reproduced combustor-outlet temperature, CO_2 , and CO within 4.5%, while overpredicting NO_x by approximately 1.8 $\times$; the work was published at ASME Turbo Expo 2026 and accepted in JEGTP.
- **Particle instrumentation and fuel campaigns:** Integrated an SMPS and catalytic stripper, then expanded the system to a nano-DMA/CPC chain for Jet A-1 and FT-SPK testing. Applied size-dependent sampling-line and stripper-loss corrections to datasets supporting the GPPS and CICS papers and the ETH Nanoparticles poster.
- **Fuel and engine-scale comparison:** Identified a maximum-load micro-turbojet condition within approximately 16 K and 24 kPa of the selected IAE V2500 idle combustor-inlet state, with an 8.6 nm particle mode. Quantified FT-SPK volumetric fuel-use increases of 8.5%, 6.5%, and 5.0% at 80%, 90%, and 100% corrected spool speed, respectively, while reducing mass-specific fuel consumption by approximately 1.5% at maximum load.
- **P220-RXi facility and collaborative program leadership:** Lead instrumentation and modification of a new JetCat P220-RXi, including pressure and temperature measurements, redesigned data acquisition, MATLAB-guided exhaust and entrainment design, and shortened sampling lines to reduce particle losses. Coordinate UBC experimental activities supporting JET-CALF, SCALE-SAF, and VLAME with TU Braunschweig, Tampere University, Sunchon National University, NRC, Boeing, and other partners.

Selected Academic Projects

Thermodynamic Cycle Analysis of a Low-Bypass Afterburning Turbofan

MECH 477 Aerospace Propulsion

Sep. 2025 – Dec. 2025

- Developed a station-by-station MATLAB solver for the Pratt & Whitney F100-PW-100, enforcing mass, energy, and momentum balances across the Brayton cycle and afterburner.
- Validated thrust, SFC, and fuel-flow predictions against published performance data, matching dry and afterburning operation within 8% at multiple operating points.
- Ran parametric sweeps in MATLAB and Python to evaluate sensitivity of cycle performance to turbine inlet temperature, pressure ratio, and component efficiency.

- Performed system-wide HVAC load calculations and heat transfer analysis to meet ASHRAE standards while minimizing energy use and ran thermal comfort modeling, predicting interior wall and operative temperatures under extreme external conditions, and applied PMV analysis to enforce comfort across all zones.
- Mapped annual building-wide energy consumption and selected equipment for sustained performance. Deployed radiant heating in rooms with severe radiant asymmetry, reducing discomfort and heating load through targeted set-point adjustments.
- Led design reviews across the team through iterative refinement to final deliverables; awarded the ASHRAE Rising Star Award and team presented the project at the 2026 ASHRAE Winter Conference.

Professional Experience

Seaspan ULC**May 2024 – Aug. 2024***ILS & LSA Systems Engineering Intern**Vancouver, BC*

- Coordinated Initial Provisioning Conferences with the Royal Canadian Navy, vendors, and project stakeholders; managed and reviewed 6,000+ technical records to support provisioning decisions and program milestones.
- Directed interns completing Engineering Review Notices, data management, and vendor follow-up, improving procurement coordination, spares-data accuracy, and compliance with project requirements.

Professional Projects

PSAR/LSAR and Storage Plan Requirements for AFFF System | *System Design, MBSE, and Logistics Analysis*

- Led PSAR development for the AFFF system aboard the JSS using MBSE tools, mapping failure modes to maintenance requirements and coordinating with LSA engineers on standards-compliant documentation.
- Authored the JSS Storage Plan Requirements, specifying stowage recommendations for ship stability and material-handling integration under MIL-STD-1388-2B.

Technical Skills

- **Scientific Computing:** MATLAB, Simulink, Python, LaTeX, Git
- **CFD, Modelling, and Design:** OpenFOAM, ANSYS Fluent, SolidWorks, OnShape
- **Experimental Combustion / Flow Diagnostics:** LabVIEW, thermocouples, pressure transducers, Prandtl probes, ECOM J2KN Pro, LI-COR LI-850 NDIR CO₂, Teledyne API T300U CO, SMPS/nano-DMA
- **Data Reduction and Analysis:** carbon-balance emission indices, uncertainty propagation, FFT, ANOVA, *t*-tests, curve fitting, image velocimetry

Leadership / Teaching

Graduate Research Mentorship and Micro-Turbojet Facility Coordination**May 2026 – Present***UBC Clean Energy Research Centre**Vancouver, BC*

- Support MASc student Tully Underhill as he extends modified-CPC measurements to assess the fuel-dependent CCN potential of micro-turbojet exhaust, and mentor BAsC student Ethan Xiong on facility upgrades, exhaust-system concepts, and CAD development; retain responsibility for engine operation, sampling integration, test-matrix design, calibration, and campaign coordination.

Teaching Assistant – MECH 360, Solid Mechanics (appointed)**Sep. 2026 – Dec. 2026***University Of British Columbia**Vancouver, BC*

- Appointed to lead weekly tutorials, develop practice material, assess student work, and provide course support during the Fall 2026 term.

LaunchPad Learning**Dec. 2020 – Mar. 2022***Java Coding Instructor**Online*

- Elevated children's programming skills by teaching Java coding online, enhancing their problem-solving abilities and computational thinking through personalized instruction and engaging, interactive lessons.