

Saptarshi Joshi

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EDUCATION

University of Illinois at Urbana-Champaign

Master of Science in Mechanical Engineering, Coursework: Electronics Cooling, Thermal Systems

Expected May 2025

GPA: 4/4

Indian Institute of Technology Bombay

Bachelor of Technology in Mechanical Engineering (Hons.), Minor in AI & Data Science

Aug 2019 - May 2023

GPA: 9.53/10 (3.97/4)

EXPERIENCE

Energy Transport Research Laboratory | Graduate Research Assistant

Aug 2023 – Present

Guide: Prof. Nenad Miljkovic | Mechanical Science and Engineering, UIUC

Urbana, IL

Manifold-Microchannel (MMC) Cooling for GaN Devices

- Optimized U-Type MMC through **CFD** for **hotspot cooling** of GaN devices, innovating microchannels with pin-fins
- Experimentally evaluating optimized MMC Microcooler performance for cooling 6 GaN devices on a PCB

Two-Phase Immersion Cooling of Li-ion Batteries

- Built an experimental setup** to study confinement effects & pressure regulation in 2-phase immersion cooling
- Conducting constant charge-discharge and current sloshing tests for immersion of single cell (21700) & 2P2P, 3P3P packs

Thermal Design of Recyclable Batteries

- Utilizing heat transfer CFD simulations in **ANSYS Fluent** and **COMSOL** for optimizing internal cooling channels to reduce thermal resistance & relocate hotspots in LIB cells

Thermal Characterization of MLI at Extreme Limits

- Designed & developed** a setup to measure conductance of MLI Radiation Shield for cryogenic superconducting motor

Thermal R&D Intern | Lennox International Inc.

May 2022 – May 2023

Advanced Technology Division | Product Development and Research Facility

Dallas, TX

- Developed and implemented a novel “green hybrid” control logic for dual fuel systems (heat pump and furnace) in a Python-EnergyPlus co-simulation, optimizing real-time cost and emissions based on regional energy data
- Achieved **25%** emissions reduction compared to traditional dual-fuel systems across **6** locations in Midwest & Northeast
- Conducted compressor testing, indoor & outdoor heat exchanger design & simulation for new heat pump products

Heat Transfer Enhancement in Pin-Fin Channels | Bachelor’s Thesis

Aug 2022 – May 2023

Guide: Prof. Rajendra Vedula | Indian Institute of Technology Bombay

Mumbai, India

- Enhanced HT in pin-fin channels for turbine blade cooling using instream rib turbulators through simulations & expts.
- Achieved a **70% enhancement** in the Average Nusselt number while keeping the pumping power constant, resulting in a heat transfer enhancement index (HTEI) of 0.93 (ANSYS Fluent, OpenFOAM, **IR Thermal Imaging**)

Laboratory of Complex Fluids Research | Intern

May 2022 – May 2023

Guide: Prof. Seyed M. Taghavi | Université Laval, Canada

Québec City, Canada

- Performed **250+** high-speed imaging & PIV experiments to study negatively buoyant jets in Viscoplastic ambient fluids; Developed an image analysis pipeline in MATLAB & identified **6** novel regimes for Re (800-12000) and Fr (10-250) range
- Trained 5 machine learning algorithms to predict laminar lengths and jet spread angle of semi-turbulent positively buoyant jets; improved on the R^2 value of 0.93 reported in literature with a R^2 value of **0.98**

TECHNICAL PROJECTS

Thermal Management of EV Battery Packs

Aug 2023 – Dec 2023

- Enhanced wavy channel BTMS using **3** hybrid cooling techniques through FEA-CFD simulations in **Fluent** and **Icepak**

Topology Optimization (TO) of Heat Sink for Two-Phase Immersion Cooling of Chips

Jan 2024 – Apr 2024

- Executed TO of a heat sink in ANSYS, leveraging an initial design derived from MATLAB-based model optimization

Unmanned Aerial Vehicles | Team Rakshak | Team Leader

Aug 2020 – June 2023

- Led a 3-tier team of **65+** students across 4 subsystems; performed CAD modeling of the UAS consisting of 250+ parts using Solidworks, aerodynamic aircraft design & manufacturing; Static Structural & impact analysis using ANSYS

TECHNICAL SKILLS

Software: ANSYS (Fluent | Icepak | Structural), LabVIEW, COMSOL, OpenFOAM, Solidworks, ABAQUS, Flotherm

Programming: C/C++, Python, MATLAB, ML & Data Science Packages (Keras, PyTorch, Scikit-learn, Pandas, Seaborn)

SELECT PUBLICATIONS

- Predicting buoyant jet characteristics: a machine learning approach**, published, *Chemical Product & Process Modeling*
- CFD Analysis of Ventilation of High Occupancy Rooms of IIT Bombay**, published in *Resonance Journal* March 2024
- Development of apparatus for evaluating cryogenic radiation shield effectiveness**, Submitted to *Cryogenics - Elsevier*