

SHAHZEB MIRZA

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SKILLS

Programming | Data Analysis: Python, MATLAB, C, SQL, Git

CFD | FEA: ANSYS (Electronics Desktop / Mechanical / Icepak), COMSOL Multiphysics

Engineering Experimentation: DOE, High Throughput Testing, High Voltage Systems, Statistical Analysis

3D CAD | PLM: Onshape, SOLIDWORKS, Autodesk Inventor, FreeCAD, Arena PLM

GD&T | Tolerance Analysis: ASME Y14.5 Advanced Certification, 3DCS Statistical Tolerance Analysis

EXPERIENCE

Product Engineer

October 2024 — Present

Conifer Inc.

Sunnyvale, CA

- Led the development from concept to customer pilot of a novel 230/460 V, 1.5 HP EC motor. Worked with cross-functional team of electromagnetic and mechanical design engineers leveraging robust Arena PLM system, while ensuring compliance with UL 1004 and IE5 efficiency standards.
- Conducted comprehensive design optimization on stators and rotors, including reduced-order modeling, DFM/DFA reviews, and FEA, ultimately reducing BOM costs by 50%, increasing efficiency by 5%, and improving power density by 30%.
- Validated in-house, reduced-order motor performance models for torque, back EMF, power factor, current draw, various EM/mechanical losses, and thermal resistances with statistical confidence.
- Prepared 50+ detailed assembly and part drawing packages for global manufacturers and tier 1/2 suppliers in accordance with ASME Y14.5 standards, while collaborating with industrial design partners to meet aesthetic requirements of final product.
- Brought up high-voltage dyno testing station with safe and automated testing capabilities and standardized EOL and accelerated life testing procedures to ensure product longevity and reliability for 40,000+ hrs.

Thermal Engineer

May 2023 — September 2024

Conifer Inc.

Sunnyvale, CA

- Engineered the thermal and mechanical design for a line of 48-72 V and 250-400 A air-cooled automotive inverters experiencing 120+ W/cm² heat fluxes, leveraging Ansys Electronics Desktop to optimize PCB layout, heat sink, and enclosure design, ultimately reducing board footprint by 30% and product weight by 40%.
- Worked with a cross-functional team of power electronics, layout, and software/firmware engineers to meet thermal requirements while minimizing EMI, transient voltage spikes, current sensing error, and current ripple/imbalance.
- Developed thermal testing procedures to validate conduction/switching loss models for inverters with statistical confidence, leading to improved device selection and thermal derating strategies that reduced the number of required MOSFETs from 12 to 6 while maintaining 90% of the original power output.

Teaching Assistant

January 2022 — May 2023

University of Toronto

Toronto, ON

- Led weekly tutorials over 2 years for classes of 60+ students in both Dynamics I and Thermodynamics II, providing additional support through office hours and online discussion forums.
- Received positive feedback from students for clear explanations and approachable teaching style, contributing to improved understanding of complex engineering concepts.

EDUCATION

University of Toronto

Toronto, ON

Master of Applied Science, Mechanical and Industrial Engineering

September 2021 — May 2023

- Conducted experimentally-driven research in high-heat flux thermal management of EV power electronics, focused on phase change heat transfer (heat pipes/plates, metallic phase change materials, evaporative cooling).
- Developed and validated novel analytic thermal models to predict phase change material heat sink performance under periodic high heat flux (100+ W/cm²) conditions, resulting in \$30,000 in scholarships for research and academic excellence.
- Thesis: *Phase Change Heat Sinks under Periodic Heating: Analysis and Experimental Verification*. Supervised by Professor Cristina H. Amon (ATOMS Laboratory) and Professor Sanjeev Chandra (CACT).
- Relevant Coursework: Computational Fluid Dynamics and Heat Transfer, Heat Transfer with Phase Change, Thermal Management of Electric Vehicles.
- Cumulative GPA: 4.0/4.0

University of Alberta

Edmonton, AB

Bachelor of Science, Mechanical Engineering

September 2015 — June 2020

- Relevant Coursework: Applied Computational Fluid Dynamics, Advanced Fluid Mechanics
- Cumulative GPA: 3.9/4.0

PROJECTS

CFD Solver

shahzeb97.github.io/2022-01-02-streamlines/

Developed a performant two-dimensional CFD solver in Python from scratch based on the SIMPLE algorithm.

PATENTS AND PUBLICATIONS

Axial Electric Machine Stator Frame and Stator Wiring Scheme, United States Patent and Trademark Office (Provisional) 2025

Rotor Embedded Impellers for Axial Flux Machine Cooling , United States Patent and Trademark Office (Provisional) 2024

Thermal response to periodic heating of a heat sink incorporating a phase change material, International Journal of Heat and Mass Transfer (doi.org/10.1016/j.ijheatmasstransfer.2024.125761) 2024

Phase Change Material-Based Cooling Systems Subject to Periodic Heating: Lumped Analysis and Experimental Verification, 2023 22nd IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm) (doi.org/10.1109/ITherm55368.2023.10177515) 2023