

# SHAHZEB MIRZA

+1 (408) 702-5834 | Sunnyvale, CA | [shahzebmirza94@gmail.com](mailto:shahzebmirza94@gmail.com) | [linkedin.com/in/shahzeb-mirza](https://linkedin.com/in/shahzeb-mirza) | [shahzeb97.github.io](https://shahzeb97.github.io)

## SKILLS

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**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

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### Product Engineer

October 2024 — Present

Sunnyvale, CA

Conifer Inc.

- 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

Sunnyvale, CA

Conifer Inc.

- Engineered the thermal and mechanical design for a line of 48-72 V and 250-400 A air-cooled automotive inverters experiencing 120+ W/cm<sup>2</sup> 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

Toronto, ON

University of Toronto

- 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

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### University of Toronto

Master of Applied Science, Mechanical and Industrial Engineering

Toronto, ON

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/cm $^2$ ) 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

Bachelor of Science, Mechanical Engineering

Edmonton, AB

September 2015 — June 2020

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

## PROJECTS

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### CFD Solver

[shahzeb97.github.io/2022-01-02-streamlines/](https://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

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**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](https://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](https://doi.org/10.1109/ITHERM55368.2023.10177515)) 2023