Dhvaneel Visaria

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Education

Stanford University | **Master of Science in Mechanical Engineering** **Sept '21 - Jun '23**
Specialization: Energy systems (ME370 series) & applications of computational modeling/ML *GPA: 3.888/4*

IIT Bombay | **Bachelor of Technology in Mechanical Engineering** **Jul '17 - May '21**
Minor in Management; Research work in materials science & thermal engineering *GPA: 9.42/10*

Experience

NanoHeat Lab | *Graduate Researcher* | *PI: Prof. Mehdi Asheghi (Stanford)* **Jan '22 - Present**

- Developing 2-dimensional model of vapor chamber evaporation wick using COMSOL simulation data & energy analysis
- Leveraging optimization principles to maximize dry-out heat flux and minimize thermal resistance for optimal design

Materials Research Lab | *Undergraduate Researcher* | *PI: Prof. Ankit Jain (IITB)* **Sep '19 - Aug '21**

- Worked on first-principles-based thermal transport calculations & machine learning applications for semiconductors
- **Materials Discovery**: Leveraged space transformation & clustering in autoencoder-based generative machine learning models to expedite discovery of graphene-like materials with exceptional thermal transport properties many-fold
- **Van der Waal's study**: Benchmarked and established effect of five different Van der Waal functionals on the thermal transport of MoS_2 using high-throughput ab-initio calculations to improve thermal conductivity simulation results
- Conferred with undergraduate research awards for exceptional research as a part of Bachelor's thesis (URA01 & URA02)

Cooling Technologies Research Center | *Research Intern* | *PI: Prof. Justin A. Weibel (Purdue)* **Apr '20 - Jun '20**

- Selected for PURE 2020 for data-driven design of high performance cold plates to select optimal heat exchange surfaces
- Constructed unique ML input using flow & heat transfer database for 700+ shapes; Best Poster award - iTherm (2021)

Publications

[1] Amey G. Gokhale, **Dhvaneel Visaria**, and Ankit Jain, "*Cross-plane thermal transport in MoS_2*", Physical Review B **104(11)**, 115403 (2021)

[2] Pai, Saeel S., **Dhvaneel Visaria**, and Justin A. Weibel, "*A Machine-Learning-Based Surrogate Model for Internal Flow Nusselt Number and Friction Factor in Various Channel Cross Sections*", 20^{th} IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (iTherm), (2021)

[3] **Dhvaneel Visaria** and Ankit Jain, "*Machine-learning-assisted space-transformation accelerates discovery of high thermal conductivity alloys*", Applied Physics Letters **117(20)**, 202107 (2020)

Academic Projects

Energy Systems Modeling | *Modeling & Advanced Concepts* **Winter '22**

- Modeled diverse and complex energy systems using core physics fundamentals and practical simplifying assumptions
- Worked with combined cycles, system exergy analysis, fuel processing, distillation, cryogenic liquefaction, and fuel cells

COVID-19 Detection using X-ray Images | *Machine Learning* **Autumn '21**

- Employed ResNet-18 based transfer learning to enable more confident COVID-19 detection using chest X-ray images
- Implemented weighted cross-entropy loss to achieve 95.26% accuracy while downplaying severe dataset class imbalance

High-Temperature Molten-State Batteries | *Principles, Materials and Devices of Batteries* **Autumn '21**

- Surveyed high temperature battery technologies for stationary energy storage systems - past, present & future potential

Neural networks parallelization | *High Performance Scientific Computing* **Spring '21**

- Implemented OpenMP and MPI enabled parallelization of genetic algorithm based neural networks to expedite training

Technical Skills

Languages: Python, C++, MATLAB, Bash
Machine Learning: Keras, PyTorch, Scikit-Learn
Software: Cantera, AutoCAD, ANSYS Fluent, Fusion360
Atomic Simulation: Quantum Espresso, VASP, Ovito, ASE

Relevant Coursework

- **Energy Systems**: Batteries, Advanced Thermodynamics, Modeling & Advanced Concepts, Battery Management Systems*, DFT-based Materials Modeling, Finite Element Method, Heat Transfer & Fluid Mechanics
- **Math & CS**: Programming Abstractions, Machine Learning, Engineering Design Optimization*, Deep Learning for Computer Vision*, High Performance Scientific Computing, Engineering Data Mining, Numerical Analysis

**to be completed*

Teaching

- **Course Assistant** | *ME 70 Introduction to Fluids Engineering* | *PI: Prof. Sindy Tang*
- **Grader** | *ME 325 Biotransport Phenomena* | *PI: Prof. Sindy Tang*
- **Teaching Assistant** | *Integral Calculus & Linear Algebra* | *PI: Prof. Rekha Santhanam & Prof. Sudhir Ghorpade*