Pochinapeddi Sai Bhargav

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Academic researcher with interests in Scientific Machine Learning (SciML), Scientific Computing, High-Fidelity numerical solver development, and Turbulence Modeling. Past researches include Computational Fluid Dynamics (CFD), Heat Transfer and Thermal management of Electric Vehicles.

EDUCATION AND SCHOLASTIC ACHIEVEMENTS

Indian Institute of Technology Madras September 2023
Master of Science in Applied Mechanics
Thesis Title: Thermal Performance of Air and Liquid-Cooled Electric Motors: A Numerical Study
Advisor: Prof. K. Arul Prakash GPA: 9.2/10

Jawaharlal Nehru Technological University Hyderabad College of Engineering (JNTUHCEH) September 2020
Bachelor of Technology in Mechanical Engineering
Advisor: Prof. A V Sita Rama Raju GPA: 9.83/10 Rank: 1/60

- Top 3 percentile among 0.14 million students who appeared in the national level exam GATE 2020 to pursue graduate studies.
- Obtained Certificate of Merit and Certificate of Scholarship for best GPA during 2nd and 3rd year of undergraduate studies.
- Secured 3rd position in best innovation and best presentation among 65 teams at the national level SAE India Aero Design competition 2019-20.
- One among the 30 students selected for the Prathibha Scholarship awarded by the government of Telangana to pursue undergraduate studies during the year 2017-2018.

RESEARCH EXPERIENCE

Indian Institute of Science Bengaluru, Computational and Data Science Dept. Bengaluru, India
Research Assistant (with Prof. Sashi Kumar Ganesan) (Aug 2024 - Present)

- Conducted extensive literature review on Physics Informed Neural Networks for turbulent flows.
- Currently working on extending FastVPINNs framework (https://github.com/cmgcds/fastvpinns) for turbulent flow problems using RANS formulation.

Tools - Python, Git, Paraview

Indian Institute of Technology Madras, Dept. of Applied Mechanics Madras, India
Graduate Research Assistant (with Prof. K Arul Prakash) (May 2021 - July 2023)

- Improved the combined thermo-hydraulic performance by 16% through design modifications of the motor casing for an air-cooled PMSM motor.
- Designed a cooling channel to meet the requirements of a 30 KW peripheral liquid cooled PMSM motor for Electric Vehicle (EV) applications.
- Conducted detailed numerical parametric studies and reduced the pressure drop by 33%.
- Built an experimental setup to test the performance of circumferential cooling channels and validate the numerical model.

Tools - Ansys WorkBench, OpenFOAM, Fluent, ICEM CFD, Matlab

PUBLICATIONS

- **Sai Bhargav, P.**, Ganapathi, M., Prakash K.A. (2022). ”Effect of housing design modifications on fluid flow and heat transfer characteristics of electrical motor casing: A numerical study”, 9th International and 49th National conference of Fluid Mechanics and Fluid Power (FMFP-2022), December 14-16, 2022. (presented) (https://link.springer.com/chapter/10.1007/978-981-99-7827-4_7)
- Ganapathi, M., **Sai Bhargav, P.**, Prakash K.A. (2023). “Numerical Study on Heat Transfer Enhancement in Plate-Fin Heat Sink of SiC MOSFET Power Inverter in Electric Vehicle Applications”, 17th International Heat Transfer Conference (IHTC-2023), August 14-18, 2023. (presented)

COURSE PROJECTS

Course: Advanced CFD - Eddy Resolving Methods (Apr - May 2021)
Guide - Prof. Nagabhushana Rao Vadlamani

- Developed a numerical code and demonstrated Adaptive Mesh Refinement (AMR) technique customized to the benchmark problem of inviscid convecting vortex in Fortran 90.
- Reduced the mesh requirements by a factor of 4 for the test case of 2D inviscid convecting vortex. (Report)

Course: Boiling, Condensation and Two-phase flows (Apr - May 2021)

- Conducted numerical studies on pool boiling in nucleate boiling regime using Ansys Fluent.

COURSEWORK AND SKILLS

- **Coursework** - Foundations of CFD, Advanced CFD, Advanced Fluid Mechanics, Boiling, Condensation, and Two-phase flows, Introduction to Incompressible turbulence.
- **Numerical Modelling** - Ansys Fluent and Workbench utilities, OpenFOAM, ICEM-CFD, In-house codes
- **Programming Skills** - Fortran, Matlab, Python | Numpy, pandas, Matplotlib and Seaborn.
- **Machine Learning frameworks** - scikit-learn, Tensorflow, PyTorch, SQL.
- **Documentation** - MS word & Excel, Latex, MS Powerpoint and beamer for presentations

INDUSTRY EXPERIENCE

Kotak Mahindra Bank (Risk Dept) Mumbai, India
Data Scientist (Jul 2023 - Aug 2024)

- Loss Forecasting (LF) FY25
  - Conducted portfolio analysis to identify appropriate cuts and vintages for the LF framework.
  - Developed a vintage model for loss forecasting of credit cards for the financial year FY 24-25.
  - Participated in budget discussions with the leadership team to finalize budget ENRs.
  - Refreshed the LF framework and conducted attrition analysis each month.
  - Draw insights from loss forecast to intimate the broader risk team to take appropriate actions.
- Banking Stability Analysis (Partial)
  - Feature Engineering for a classification model based on debit card transaction data.
  - Variable creation such as frequency and value of credit/debit transactions, Avg Monthly balance, etc.. for each customer based on banking data.
- Income Estimation (Partial)
  - Estimated the income based on the transaction narration of banking transaction data using methods such as keywords, time constraints, etc..
- Carried out ad hoc activities such as working with NPA files, plot loss given default curves, data preparation for various analysis, etc..
- Guided interns on improving the existing LF framework using sequence models (RNNs, LSTMs), working with cards transaction data, etc..

Tools - SAS/SQL, Excel, Python, Sandbox

POSITIONS OF RESPONSIBILITY

- **Teaching Assistant | AM5630: Foundations of CFD** (Aug - June 2021)
  - TA for a course on Foundations of CFD for two consecutive semesters offered at IITM.
  - Conducted tutorial sessions on the implementation of numerical schemes based on Finite Volume Method.
  - Monitored and evaluated assignments, quizzes, and exams for a group of 20 students.
- **Coordinator | Workshops and Skill Building, CDCR** (Aug - July 2022)
  - Helped organize various workshops as a part of Workshops and Skill Building, CDCR at IITM.
  - Took feedback and organized Q&As for various workshops.
- **Coordinator | Saathi PG program, IITM** (Aug - Dec 2021)
  - Mentored incoming postgraduate students to ensure smooth onboarding.
- **Technical Coordinator | Connaissance 20, JNTUHCEH** (Jan - Mar 2020)
  - Guided a team of 12 students to build scaled down prototypes of mechanisms within a budget of INR 0.2 lakhs.

CERTIFICATIONS

Oxford Machine Learning Summer School (OxML 2023)	Comprehensive course covering ML fundamentals and advanced topics in ML theory
Foundations of **Data Science** (22w)	Statistics & Probability, Programming, Data Preprocessing & Visualization.
Machine Learning in Python (13 w)	Supervised Learning Algorithms, Building Predictive models.
Deep Learning Specialization (5 c)*	Fundamentals of Deep Learning with applications in Computer Vision and NLP.
Tensorflow Developer Specialization (4 c)	Tensorflow for Image classification, Natural Language Processing and Time Series.
Natural Language Processing Specialization (4 c)*	NLP with classification and probabilistics models, build sequential models, etc..

w - weeks, c-courses, * Ongoing