Ashutosh Kumar

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Summary

Mechanical engineer focused on **CFD** and **scientific computing**, experienced in **OpenFOAM (C++)**, thermo-fluid and multiphase modeling, and solver development. Skilled in hybrid meshing, heat transfer, and solidification simulations, with exploratory work on **2D PINNs** using **PyTorch** and **JAX**. Strong grasp of **numerical methods** and **physics-based modeling** with a research-driven approach.

Education

B.I.T.Sindri 2020 – 24
B.Tech Mechanical Engineering *CGPA : 8.21/10*

The Pentecostal Assembly School 2018 - 20
AISSCE *90.2 %*

Experience

Novacast India | *CFD Engineer - Software Development* Jan 2025 – Present

- Conducted computational modeling of casting processes involving Navier–Stokes, conjugate heat transfer, multiphase flow, and alloy solidification using **OpenFOAM**.
- Developed and validated solver modules **(C++)** for coupled thermo-fluid systems with emphasis on numerical stability, boundedness, and convergence.
- Engineered hybrid hex-dominant meshing algorithms and **SDF**-based implicit geometry modeling for robust multi-region domains.
- Automated data acquisition and simulation setup workflows using **Python** and **SQLite3** for scalable process simulation.
- Integrated **VTK**-based post-processing pipelines and real-time visualization using **ADIOS/Catalyst**.
- Authored internal technical documentation detailing solver validation, model formulations, and algorithmic developments.

IIT Bombay | *FOSSEE Summer Research Fellow* Jun 2023 – Aug 2023

- Investigated low Reynolds number flow over **Convergent–Divergent Riblets** for NLF aircraft wings using **OpenFOAM**.
- Evaluated parametric effects on aerodynamic performance through CFD-based laminar–turbulent transition studies.
- Documented workflow, simulation results, and findings for integration into the national FOSSEE CFD library.

Positions of Responsibility

Vayu BITS —— Co - founder and Team Lead, Aeromodeling and DDC competition
Trailblazers V —— Team Leader, Winner Automotive Aerodynamic Design
Mechanical Engineering Society —— Solidworks Workshop Mentor, CFD Mentor
SAE India BIT Sindri —— Technical Team Member (Design and CAE)
Aero and Robotics Club (ARC) —— Alumnus Mentor cum Member

Skills

CFD Tools / Softwares: OpenFOAM, Star-CCM+, Simscale
Operating Systems: Windows, Linux Ubuntu
Languages: Python (OOP), C++, MySQL, HTML, Matlab, R, GNU Octave
CAD/CAE Tools: Catia, Siemens NX, Solidworks, Simscale
Machine Learning / AI: PyTorch, JAX, Deep Learning, Machine Learning
Office Tools: MS PowerPoint, MS Word, MS Excel
Soft Skills: Communication, Team Management, Project Management

Certifications and Courses

Intro to Siemens NX: Engineering Essentials and Part Design | *Siemens*	May 2024
Siemens NX Mastery: Advanced Design & Applications | *Siemens*	Jun 2024
Mechanical Engineering Design and Manufacturing with Fusion 360 | *Autodesk*	May 2024
Introduction to Model-Based Systems Engineering | *Siemens*	Sep 2024 - Current
Urban Air Mobility | *TU Munich / Airbus Urban Mobility*	Sep 2024
Design and Simulate the Aerodynamics of Propellers in MATLAB | *Eliott Wertheimer*	Jan 2024
Applied Computational Fluid Dynamics | *Siemens*	Sep 2023
FEM - Linear, Nonlinear Analysis & Post-Processing | *Simscale*	Jun 2022
Finite Element Analysis Convergence and Mesh Independence | *Simscale*	Jun 2022
Model Based Design | *Decibels Lab*	Jul 2022
Simulink Onramp | *Mathworks*	Jun 2022
Matlab Onramp | *Mathworks*	Nov 2020

Achievements

FOSSEE OpenFOAM Fellowship — *Best Screening Task*
SAE India Efficycle — *Top 5*
SAE India AutoSparx — *Winner*
Best Bachelor's Dissertation Project — *Top 3*
National Science Olympiad — *Winner*