Jagrut Brahmbhatt

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EDUCATION:

Georgia Institute of Technology, Atlanta, GA — May 2026 (Expected)

Master of Science in Mechanical Engineering | GPA – 3.87

Relevant Coursework: Glasscore Semiconductor Packaging, Introduction to MEMS devices, Finite Element Analysis, Computational Fluid Dynamics, Modeling & Simulation.

Gujarat Technological University, India — Jul 2021

Bachelor of Engineering in Mechanical Engineering | GPA – 3.85

PROFESSIONAL EXPERIENCE:

MPCF Laboratory – Georgia Institute of Technology, USA — Mar 2025 – Present

Graduate Research Assistant

- Developing fretting wear and fatigue failure models using Finite Element Analysis and Experimental methods for commercial jet engine turbine/compressor sections, collaborating with industry engineering experts to analyze field performance data and improve component reliability.
- Gained hands on experience in Lathe and Mill operations for Aluminum & Titanium at the Montgomery Machining Mall for fatigue specimen preparation.

CaSPAR Laboratory – Georgia Institute of Technology, USA — Aug 2024 – Mar 2025

Graduate Assistant – electronic packaging design

- Contributed to development of capillary driven (10 μm) microchannel heat exchangers in ANSYS Fluent using multiphase flow models to optimize thermal performance under varying boundary conditions, improving thermal reliability.
- Developed detailed 2D/3D CAD models in SolidWorks for capillary systems, integrating precision assembly constraints and rapid prototyping tolerances.
- Validated thermal performance and cooling strategies through LabVIEW-controlled experiments, identifying package failure paths and deciding appropriate thermal interface material (TIM).
- Gained hands-on experience with PCBA packaging processes and microfabrication including photolithography, CVD, femtosecond laser ablation, and chip bonding techniques.
- Participated in early-stage design through test procedure development, sensor placement strategy, and post-fabrication analysis.

Larsen & Toubro Limited (Heavy Engineering Works), India — Aug 2021 – Jun 2024

Senior Design Engineer – Pressure Vessels & Reactors

- Spearheaded mechanical design and analysis of high-pressure vessels and reactors for national & global clients, applying FEA (ANSYS), seismic/buckling/fatigue assessments, and Geometric Dimensioning & Tolerance analysis (GD&T) in compliance with ASME Section VIII, Div 1&2.
- Reduced raw material, fabrication and inspection costs exceeding $335,000 through DFM-led redesigns of vessel supports and cladded plates, ensuring mechanical integrity under thermal, vibrational, fatigue, and internal pressure loads for polysilicon CVD Reactors.
- Performed fatigue analysis as per ASME Sec. VIII Div 2 for two agitator vessels for PTFE industry, validating design against client input loads.
- Managed full product lifecycle documentation: from functional specifications to detailed BOMs and fabrication drawings (SolidWorks, AutoCAD, UG-NX), integrating customer-driven change orders and PLM protocols.
- Directed a team of 2 CAD engineers and led interdepartmental design reviews, ensuring manufacturability, supply chain readiness, and streamlined production handoff.
- Conducted client-facing design presentations, incorporated feedback into iterative product enhancements, and ensured regulatory and QA compliance across multiple international projects.

ACADEMIC AND RESEARCH PROJECTS:

Parametric thermomechanical analysis of a glass substrate flip chip electronic assembly — Jan 2025 – Apr 2025

- Formulated and validated thermomechanical reliability of a glass substrate electronic package with 50 μm connection pitch using ANSYS Mechanical, incorporating viscoplastic solder behaviour and mesh convergence with <1% error.
- Prepared 3D models using SolidWorks and applied heat transfer principles and element birth/death to effectively capture manufacturing induced stresses.
- Conducted parametric studies and optimised glass thickness and underfill fillet, improving solder joint fatigue reliability by 37% & reducing assembly deflection by 400%.

Machine Learning using Python — Jan 2025 – Apr 2025

- Built Random Forest and neural network models in Python to predict composite stiffness from image-derived microstructural features.

Development of Computational Fluid Dynamics (CFD) Solvers in MATLAB. — Aug 2024 – Dec 2024

- Programmed a custom CFD solver for internal channel flow simulations using vorticity-stream function formulation; validated against analytical benchmarks for laminar flow regimes.
- Prepared Geometry and carried out meshing using python pygmsh. Validated mesh metrics such as aspect ratio/ Jacobian ratio/ element quality of the scripted mesh with commercial solver mesh metrics.

Parametric Computational Fluid Dynamics (CFD) analysis of Pulse Tube Cryocoolers. — Dec 2020 – Jul 2021

- Optimized Pulse Tube Cryocooler design through CFD analysis and parametric modeling, using concepts of radiative heat transfer at cryogenic temperatures, achieving 43% faster cooldown (120s vs. 210s) and 15% lower operating temperature (70K vs. 82K)

PUBLICATIONS:

- A Cognitive Chatbot for Intelligent Engineering Analysis Decision Support: A Case of Optimizing Computational Fluid Dynamics of Cooling Server Stacks. 2025, February. https://doi.org/10.46254/AN15.20250535.

SKILLS:

CAD & Modeling Tools: SolidWorks, AutoCAD, UG-NX, CATIA, PTC Creo
Simulation & Analysis: ANSYS Mechanical, ANSYS Fluent, ANSYS Workbench, CFD-Post, Staad.PRO
Programming & Scripting: Python (pygmsh, NumPy, pandas, scikit-learn, matplotlib), MATLAB, LabVIEW, Excel VBA
Mechanical Design & Standards: FEA, CFD, DFM, Tolerance Stack-up, ASME Section VIII Div. 1 & 2, GD&T (ISO 2768, ANSI Y14.5)
Fabrication & Manufacturing: Microfabrication (Photolithography, DRIE, CVD, Laser Ablation), Lathe, Mill, BOM Creation, PLM Tools
Testing & Prototyping: Semiconductor Packaging Validation, Functional Test Plans, Experimental Validation.
Other Tools: Microsoft Office Suite, LabVIEW, Product Lifecycle Management (PLM)