Jagrut Brahmbhatt

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Education

Georgia Institute of Technology, Atlanta, GA
Master of Science in Mechanical Engineering | GPA – 3.88
Relevant Coursework: *Finite Element Analysis, Fracture Mechanics, Inelastic Deformation of Solids, Glasscore Semiconductor Packaging, Machine Learning for Mechanical Engineers, 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 | Sponsors: Pratt & Whitney
- Simulated Jet Engine disk–blade fretting fatigue in **ABAQUS**.
- Optimized simulation runtime by **62%** using system integration and top-down meshing.
- Predicted far-field stress in fretting specimens under vibration; validated with experimental data.
- Evaluated **high-temperature fatigue** of Inconel Alloys and corrosion-driven crack initiation/propagation mechanisms.
- Released precision **CAD/GD&T** drawings for fretting fatigue test **jigs, fixtures**, and assemblies.

CaSPAR Laboratory – Georgia Institute of Technology, USA Aug 2024 – Feb 2025
Graduate Assistant – microelectronic packaging design
- Developed **ANSYS CFD** heat transfer model for microchannel heat exchangers; achieved **97% correlation** with analytical models.
- Validated **single-phase thermal** performance through **DOE**-driven analysis and **LabVIEW** experiments.
- Executed **Finite Element Analysis (FEA)** of heat-exchanger cracking; mitigated failures via geometry optimization.
- Conducted **cleanroom microfabrication** for glass-substrate packaging using **CVD, etching, and DRIE**.
- Simulated **RF circuits and IC interconnects** in **ADS** and **SONNET**; evaluated substrate-dependent loss and Q-factor.

Larsen & Toubro Limited (Heavy Engineering Works), India Aug 2021 – Jun 2024
Senior Mechanical Design Engineer | Large-Scale High-Pressure Systems
- Achieved **$335,000+** in cost savings through **FEM-driven** design improvements for **fatigue and vacuum** systems.
- Achieved **10% faster** project completion through **rapid manufacturing** drawing preparation and expedited design approvals.
- **Led** cross-functional design teams, integrated **P&ID/CAD** models, and delivered BOMs for high-pressure vessels.

Academic and Research Projects

Thermomechanical reliability design using FEA for opto-mechanical packaging. Jan 2025 – Apr 2025
- Built **FEA** framework for die-on-glass (50 micron pitch) interconnects using **ANSYS Mechanical** for **thermal–structural failure** improvement.
- Modeled **viscoplastic solder**, parametric design variation, and simulated **fatigue life prediction** for flip-chip assemblies.
- **Improved** solder joint reliability by **37%** and **reduced** maximum deflection by a **factor of 3** via parametric optimization.

Machine Learning using Python Jan 2025 – Apr 2025
- **Developed** and optimized a **Random Forest classifier** using acoustic emission (AE) signal features.
- **Achieved 86.4%** accuracy in detecting blocked conditions of FDM 3D printers.

Development of Computational Fluid Dynamics (CFD) Solvers in MATLAB Aug 2024 – Dec 2024
- **Pioneered** a custom solver for internal channel flow; validated with **97%** agreement v/s analytical results and **ANSYS Fluent**.

Probabilistic Optimization using MATLAB Aug 2024 – Dec 2024
- Developed **Monte Carlo reliability model** for stainless-steel pipelines; established 95% reliability bounds.
- Built **MATLAB** framework (regression + fmincon) to predict pressure drop and reliability index for stainless steel pipelines.

Publications

- A Cognitive Chatbot for Intelligent Engineering Analysis Decision Support: A Case of Optimizing Computational Fluid Dynamics of Cooling Server Stacks. 2025, February. (DOI Link).

Skills

Domains: Flip-Chip Reliability, High Pressure/Vacuum Systems, Opto-Mechanical Systems, Semiconductor Process Integration.
Simulation & Analysis: ABAQUS, ANSYS Mechanical, ANSYS Fluent, MATLAB, CFD-Post, SolidWorks, Creo, CATIA, Python.
Design & Modeling: CAD/GD&T Drawings, Tolerance Analysis, Structural & Thermal FEA, Fatigue and Creep Simulation.
Fabrication & Testing: Cleanroom Microfabrication, CVD, DRIE, Wet Etching, Optical/Fixture Design, Thermo-mechanical Reliability Testing.
Programming & Scripting: Python (NumPy, pandas, scikit-learn, matplotlib), MATLAB, C++, GitHub, LabVIEW, Excel VBA.
Mechanical Design & Standards: FEA, CFD, DFM, Tolerance Stack-up, ASME Section VIII Div. 1 & 2, GD&T.
Fabrication & Manufacturing: PCB Assembly, Microfabrication, LabVIEW-controlled Testing.