# Shreyas Nagaraj

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Innovative mechanical engineer professional driving product development through expertise in CAD, AI generative design, additive manufacturing, FEA, and CFD, delivering optimized mechanical systems from concept to validation.

## WORK EXPERIENCE

**The Pennsylvania State University – School of Engineering Design and Innovation** — State College, PA, USA

*Graduate Research Assistant* — Feb 2024- Present

- Engineered and analyzed nine novel multi-material (PLA/TPU) interfacing techniques, performing extensive Finite Element Analysis to characterize their mechanical performance under tensile and cantilever beam loads.
- Synthesized complex simulation data and fundamental design principles into a novel set of heuristic cards, creating an accessible design guide to empower engineers in overcoming common challenges in multi-material 3D printing.
- Conducted foundational research into diverse joining methods—including biomimicry, traditional joinery, architectural and textile principles and performed preliminary FDM print trials to establish key manufacturability rules for PLA/TPU co-deposition.

**The Pennsylvania State University – School of Engineering Design and Innovation** — State College, PA, USA

*Graduate Teaching Assistant* — Aug 2023- Present

- Instructed an introduction to engineering design course to 350+ students, fostering teamwork, communication, and ethical decision-making to develop innovative solutions in complex real-world scenarios.

**Zeta Biosystem (Formerly Biotree) – Bioprocess Engineering** — Bengaluru, India

*Engineer Design – Design Team* — Feb 2022- Apr 2023

- Designed and optimized CIP & SIP compatible 3D bioprocess piping systems and P&ID-driven 2D layouts, ensuring aseptic integrity, minimizing pressure drops through CFD and enhancing fluid flow for upstream and downstream process equipment.
- Engineered vessel and piping integration strategies, implementing GMP-compliant hygienic design, zero-dead-leg valves, and ASME BPE standards to achieve a 13% increase in operational efficiency.
- Developed and validated process equipment layouts, applying system design principles to optimize bioreactor and chromatography skid configurations, which enhanced mass transfer, ensured sterility, and improved system reliability by 20%.

**Tata Advanced Systems Limited – Aerospace Engineering** — Bengaluru, India

*Intern – Production Team* — Mar 2021 – Apr 2021

- Assisted design validation and assembly oversight for the Integrated Warfare System, ensuring seamless integration and compliance with defense standards and optimizing production by troubleshooting issues, identifying root cause and streamlining workflows.

**Hindustan Aeronautics Limited (HAL) – Aerospace Engineering** — Bengaluru, KA, India

*Design Intern – Adour Engine Team* — Jun 2019- Jul 2019

- Developed manufacturing workflows and documentation of turbine lines by implementing DFM principles and GD&T standards to enhance production efficiency, design, and manufacturing accuracy of aeronautical components.

## EDUCATION

**The Pennsylvania State University, School of Engineering Design and Innovation** — Aug 2023- Aug 2025

Master of Science in Engineering Design — GPA : 3.96/4

*Courses: Design for Additive Manufacturing, Systems Design, New Product Innovation, Sustainable Innovation*

**Dayananda Sagar College of Engineering, Karnataka** — Aug 2017- May 2021

Bachelor of Engineering in Mechanical Engineering — GPA : 3.2/4

## PROJECTS

**Mars Sample Return Simulation Challenge-** Fusion 360- Generative Tools & nTopology

- Designed an impact resistant landing system using generative design and topology optimization, creating a lightweight yet robust structure to protect sample tubes from a 100ft drop.
- Optimized for additive manufacturing by integrating advanced lattice structures and stress-driven geometries, reducing material usage while maximizing energy absorption and structural integrity. Conducted testing to verify structural integrity.

**Quick Trike- Adaptive Mobility Solutions-** Fusion 360- Generative Design, Ansys Mechanical

- Led iterative prototyping and user-centered design to develop an adaptive trike attachment, enabling seamless wheelchair traversal over rough terrain with enhanced stability and maneuverability.
- Engineered a compliant mechanism for shock absorption and terrain adaptability, optimizing performance through rigorous testing, analysis, structural refinement and cost-efficient manufacturing strategies.

## SKILLS

**Design & Analysis**- SolidWorks, NX Design Center, Autodesk Inventor, Fusion 360, AutoCAD, Ansys Mechanical, nTopology, CATIA, Creo

**Tools -** Generative Design, GD&T, CFD, FEA, Microsoft Excel, PLM Siemens, Adobe Creative Cloud, Adobe Premier Pro, Navisworks