

Shashwat Patnaik

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EDUCATION

University of Michigan

Ann Arbor, MI

Master of Science in Aerospace Engineering

May 2024

GPA: 4.00 / 4.00; Coursework: Computational Fluid Dynamics, Turbulent Flows, Multidisciplinary Design Optimization, Thermal Engineering, Heat Transfer, Non-Linear Analysis

Delhi Technological University

Delhi, India

Bachelor of Technology in Mechanical Engineering

June 2022

GPA: 9.08 / 10.0; Coursework: Design of Machine Elements, Kinematics and Dynamics of Machines, Mechanics of Solids

SKILLS

CAD:	SolidWorks (CSWP), Catia V5, Fusion 360, Auto-desk Inventor, SpaceClaim
Simulation and Analysis Software:	ANSYS-FLUENT, Simulink, OpenFOAM, StarCCM+, OpenMDO, Paraview, Tecplot
Language and Analysis:	Python, MATLAB, C++, OpenMPI, CUDA, GIT, Linux

WORK EXPERIENCE

MDO Lab - University of Michigan

Ann Arbor, MI

Research Assistant

August 2024- Present

- Developed an automated body-fitted FFD generation tool and an interactive editing system, streamlining geometric parametrization, reducing computational time and manual adjustments by 10–30%, and achieving a lower objective solution.
- Designed a fuselage shape optimization algorithm in OpenMDO, integrating GeoGrad to enforce spatial integration constraints, improving aerodynamic performance, and ensuring adaptability to customer payload requirements.
- Implemented a parsing and vectorization system for RAGS, optimizing processing and Q&A functionality for multiple formats.

DTU Altair

Delhi, IN

Lead Mechanical Engineer

August 2019- July 2022

- Engineered a small-scale satellite's payload wing, enhancing lift by 20% through MATLAB and XFOIL optimization.
- Managed full lifecycle development of deployment mechanisms, improving structural rigidity by 7% through advanced mechanism design, kinematics modeling, testing, and validation.
- Developed micro-autonomous robots and UAVs, integrating actuators and electromechanical systems, and used SAP PLM to reduce development and review cycles by 15%.

Maruti Suzuki India Limited

Delhi, IN

Mechanical Engineering Intern

May 2019- July 2019

- Executed failure analysis on 20 automotive components, using design review with design of experiments (DOE) to identify root causes and implement preventive measures, reducing component failure rate by 10%.
- Conducted material fracture analysis and developed a comprehensive database for failure topography mapping, enhancing the predictive accuracy of component lifespan by 8%, and contributing to R&D efforts focused on product development.

DTU Super Mileage Vehicle

Delhi, IN

Aerodynamics Lead-Engineer

August 2018– December 2018

- Designed vehicle chassis, prepared engineering drawings, and developed manufacturing processes, including building fixtures, to ensure precision; reduced weight by 27% while maintaining structural strength.
- Created CAD models in SolidWorks to design mechanical systems and vehicle aerodynamic components, decreasing drag coefficient by 0.05 through fluid simulation (Computational Fluid Dynamics - CFD) and wind tunnel testing.
- Coordinated with the powertrain team on mechanical and thermal analysis, optimizing design and achieving a 15% cost reduction.

PROJECTS

Optimization of mono-blade pods to exhibit unconventional descent mechanism (DOI)

Ann Arbor, MI

- Optimized the coefficient of power by 28% using Blade Element Momentum Theory in MATLAB for Fluid-Structure Interaction, and designed a 6-DOF dynamic pod model in SIMULINK, reducing drift by ~10% across all axes.

Fluid Mechanics - higher order finite volume and discontinuous Galerkin numerical method solver (Project)

Ann Arbor, MI

- Programmed a modular higher-order FVM (Finite Volume Method) solver in C++ with OOP and HPC optimization, utilizing CUDA and OpenMPI to simulate compressible and turbulent flows.
- Implemented adjoint-based mesh adaptation, improving convergence rates and wall-time with ~2× over uniform refinement.

RESEARCH EXPERIENCE

Computational Aerosciences Laboratory

Ann Arbor, MI

- Implemented a Lagrangian PDF solver using the Generalized Langevin Model to simulate turbulent channel flows, performing bug verification and testing for numerical stability in iterative algorithms.