

# Shashwat Patnaik

• spatnaik@umich.edu • +1 (734) 596-7586 • [LinkedIn](#) • [Portfolio](#)

## 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, Flight and Trajectory Optimization, Multidisciplinary Design Optimization, Thermal Engineering, Heat Transfer, Non-Linear Analysis

### Delhi Technological University

Delhi, India

Bachelor of Technology in Mechanical Engineering

June 2022

Coursework: Design of Machine Elements, Kinematic and Dynamic of Machines, Mechanics of Solid, Mechanics of Material

## SKILLS

CAD:

SolidWorks (CSWP), Catia V5, Fusion 360, Auto-desk Inventor, SpaceClaim

Simulation and Analysis Software:

ANSYS, Simulink, OpenFOAM, StarCCM+, OpenMDO, HyperMesh, Icepack

Language and Analysis:

Python, MATLAB, C++, Valgrind, Openmpi, Openmp, GIT, Linux, Cuda

## WORK EXPERIENCE

### 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 of deployment mechanisms using Siemens Teamcenter and ENOVIA, overseeing design, integration, and testing, reducing development time by 30%.
- Led a team of 6 engineers in developing and validating micro-autonomous robots and UAVs, using Autodesk Fusion Lifecycle and SAP PLM to improve collaboration and cut development and review cycles by 15%.
- Supported project planning and resource allocation, increasing on-time delivery by 20% and cutting risks by 15%.

### Maruti Suzuki India Limited

Delhi, IN

Mechanical Engineering Intern

May 2019- July 2019

- Conducted failure analysis on 20 automotive components using design of experiments (DOE) to identify root causes and implement preventive measures, reducing the component failure rate by 10%.
- Developed and maintained a comprehensive failure analysis database, improving failure prediction accuracy by 8%.
- Collaborated with senior engineers in project planning and execution phases, including documentation and progress tracking.

### DTU Super Mileage Vehicle

Delhi, IN

Aerodynamics Lead-Engineer

August 2018- December 2018

- Designed vehicle chassis and shell in SolidWorks, conducted flow simulation and wind tunnel testing, and performed structural analysis in ANSYS, reducing weight by 27%.
- Executed structural and thermal analysis in ANSYS, ensuring compliance with client's performance requirements.
- Partnered with the powertrain team on mechanical and thermal analysis, optimizing the design to contribute to a 15% reduction in costs and ensuring project success within budget and timeline constraints.

## PROJECTS

### Structural Mechanics - Structural Analysis of Composite Wishbone Structure (Upper-A Arm)

Delhi, IN

- Performed FEA fatigue analysis of a carbon fiber wishbone, analyzing compressive and bending loads, improving fatigue life by 1000 times compared to traditional aluminum wishbones for Formula Student.

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

Ann Arbor, MI

- Optimized the coefficient of power by 28% in MATLAB using Blade Element Momentum Theory for Fluid-Structure Interaction and element-based computational methods as the physics simulation.
- Designed a 6-DOF dynamic pod model in SIMULINK to reduce drift in all axes by ~10%, showcasing industrial applications.

### Fluid Mechanics - higher order finite volume and discontinuous galerkin numerical method solver

Ann Arbor, MI

- Programmed adjoint-based mesh adaptation and algorithms for local refinement, and developed functions for the flux-limiter
- Developed first and second-order Finite Element Method (FEM) and Finite Volume Method (FVM) to simulate compressible flow and turbulent flow over the multi-element airfoil using SSP-RK2 with local time stepping.

### Aerodynamic shape optimization of small unmanned aerial vehicles

Ann Arbor, MI

- Implemented a non-gradient optimizer (IPOPT) in OpenMDO for fuselage shape optimization, adaptable to any payload, using Free Form Deformation (FFD) as computational geometry and adjoints for derivatives in ADFlow through scripting.