# 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, Multidisciplinary Design Optimization, Thermal Engineering

**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, Mechanics of Materials, Heat Transfer, Non-Linear Analysis

## SKILLS

*CAD:*     SolidWorks (CSWP), Catia V5, Fusion 360, Auto-desk Inventor, SpaceClaim
*Simulation and Analysis Software:*     ANSYS, Fluent, Simulink, OpenFOAM, STAR-CCM+, OpenMDO, HyperMesh
*Language and Analysis:*     Python, MATLAB, C++, PyTorch, OpenMPI, OpenMP, GIT, Linux, CUDA

## 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 an aerostructural optimization framework 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, electromechanical systems, and thermal management; used SAP PLM to optimize design and reduce review cycles by 15%.
- Prototyped micro-robots and satellite payloads using 3D printing, cutting development and fabrication time by 25%.

**Maruti Suzuki India Limited**     **Delhi, IN**
*Mechanical Engineering Intern*     *May 2019- July 2019*
- Executed failure analysis on 20 engine automotive components, including thermal cycling effects, using design of experiments (DOE) to identify root causes and reduce failure rate by 10%.
- Conducted material fracture analysis and developed a comprehensive fracture mechanics database and failure topography mapping, improving failure prediction accuracy by 8% and enhancing R&D-driven component lifespan analysis.

**DTU Super Mileage Vehicle**     **Delhi, IN**
*Aerodynamics Lead-Engineer*     *August 2018– December 2018*
- Engineered vehicle chassis, prepared engineering drawings, including building fixtures; reduced weight by 27%.
- Designed CAD model for vehicle aerodynamic components in SolidWorks and optimized drag reduction using CFD simulations, decreasing the drag coefficient by 0.05 based on wind tunnel validation.
- Coordinated with the powertrain team on mechanical and thermal analysis, optimizing design and achieving a 15% cost reduction.

## PROJECTS

**Structural Mechanics - Structural Analysis of Composite Wishbone Structure (Upper-A Arm)**     **Delhi, IN**
- Performed Finite Element Analysis (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 pod's wing shape using Blade Element Momentum Theory in MATLAB; improving coefficient of power by 18%
- Developed a 6-DOF dynamic pod model in SIMULINK, reducing drift by 10% across all axes and enhancing descent stability.

**Fluid Mechanics - Higher order finite volume and discontinuous galerkin numerical method solver**     **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.