

SHASHWAT PATNAIK

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EDUCATION

Master of Science in Aerospace Engineering, University of Michigan - Ann Arbor August 2022 - May 2024
GPA: 4.00 - Relevant Coursework: Advanced Computational Fluid Dynamics, Turbulent Flows, Flight and Trajectory Optimization, Multidisciplinary Design Optimization, Fluid System, Thermal Engineering, and Gas Dynamic and Jet Propulsion.

Bachelor of Technology in Mechanical Engineering, Delhi Technological University August 2018 - June 2022

SKILLS

CAD	Solidworks (CSWP), Catia V5, Fusion 360, Auto-desk Inventor
Simulation and Analysis Software	ANSYS, Simulink, OpenFOAM, STAR-CCM+, COSMOL, OpenMDO
Language and Analysis	Python, MATLAB, C++, Valgrind, OpenMPI, and PX4

WORK EXPERIENCE

DTU ALTAIR *Delhi, IN*
Team Supervisor August 2019 - July 2022

- Increased lift by 20% for a small-scale satellite's payload wing, through **MATLAB** and **XFOIL** optimization for CANSAT 2021.
- Implemented algorithms to deploy payload and **control system**.
- Coordinated 5-6 members in various competitions to create robots for micro-autonomous robots and drones.

MARUTI SUZUKI INDIA LIMITED *Delhi, IN*
Mechanical Engineering Intern May 2019 - July 2019

- Investigated **failure analysis for various automotive components** and identified prevention methods.
- Analyzed the fracture features and developed a database of the topography of the fracture surface to the causes.

DTU SUPER MILEAGE VEHICLE *Delhi, IN*
Aerodynamics Lead-Engineer August 2018 – December 2018

- Developed vehicle outer chassis through **vacuum bagging** (CFRP), decreasing gross weight by 27%.
- Designed and simulated the chassis and the vehicle's outer shell utilizing **Solidwork** and **ANSYS**.
- Integrated two-cylinder engine and transmission to meet competition requirements.

PROJECTS AND PUBLICATION

First and second-order finite volume solver to simulate flow over the multi-element airfoil April 2023

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

Optimization of monoblade pods to exhibit unconventional descent mechanism (DOI**)** January 2022

- The coefficient of power as cost function was optimized by 28% in MATLAB by using an **element-based computational method**.
- Computed **6-DOF** dynamic model of the pod through **SIMULINK** to reducing drift in all axis by 12%.

Implementation of Bio-Inspired Riblets in Supersonic Nozzles July 2022

- Established a **RANS** framework in **OpenFOAM** to exhibit the viability of riblets on nozzles to delay separation.
- Computed fluctuations in kinetic energy and wall shear stress of the flow, demonstrating riblets create higher momentum at near-wall flow, delaying the separation by 11%.

Aerodynamic shape optimization of small unmanned aerial vehicles Ongoing

- Implemented **non-gradient optimizer** (IPOPT) using OpenMDO for the shape of the fuselage, adaptable to any payload, utilizing **Free Form Deformation (FFD)** and adjoints for derivatives within ADflow.

PDF modeling using Generalized Langevin Model for turbulent channel flow Ongoing

- Implemented a **PDF stochastic Lagrangian model** using the Generalized Langevin Model and quadratic 2-Stage least square regression method to model turbulent channel flow.