

Harsh Ingle

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Summary

A highly driven Aerospace Engineering undergraduate with strong hands-on experience in mechanical design, structural analysis, and prototyping. Skilled in developing complex electromechanical systems, including a 19-DOF prosthetic hand and an insect-inspired ornithopter. Proficient in CAD modeling (Fusion 360, SolidWorks), FEA/CFD simulation (ANSYS), kinematic analysis, and 3D printing. A fast learner with strong problem-solving abilities, consistently integrating engineering principles with practical fabrication to build efficient, high-precision mechanisms. Actively seeking opportunities in Machine Design, Manufacturing, and Aerospace Engineering.

Technical Skills

- **CAD/Design:** Fusion 360 (Proficient), SolidWorks, CATIA, AutoCAD
- **Simulation & Analysis:** ANSYS (Structural & CFD), Finite Element Analysis (FEA), Kinematic Analysis, MATLAB
- **Manufacturing & Core:** Machine Design, GD&T, 3D Printing (PLA+, HPEGT), Material Selection, Mechanism Design
- **Programming:** Embedded C, Arduino IDE, Java
- **Tools & Hardware:** N20 DC Motors, ESP8266, Sensors (MPU6050), Prototyping & Testing

Projects

Biomimetic Prosthetic Hand — 19 DOF

Fusion 360, ANSYS, MATLAB, Embedded Systems, Mechanism Design

- Engineered a fully functional **19-DOF biomimetic prosthetic hand** replicating human finger and wrist biomechanics using tendon-driven actuation.
- Designed joint structures for all phalanges with integrated **helical compression return springs** enabling natural finger recoil and smooth articulation.
- Achieved realistic wrist motion with **flexion-extension: -50° to 80°** and **pronation-supination: 0° to 160°**, powered through a dual-motor gear-driven mechanism.
- Modeled the complete prosthetic assembly in **Fusion 360** and validated high-stress regions using **ANSYS FEA** for structural reliability under dynamic loading.
- Implemented N20 high-torque DC motors for tendon actuation, ensuring precise finger movement and improved grip stability.
- Fabricated using PLA+ (fingers) and HPEGT (palm and wrist) and conducted grasp tests on a bottle, ball, and marker to evaluate dexterity and grip performance.

B-DOT Bio-Inspired Ornithopter (Insect-Type Flapping Wing UAV)

CAD Modeling, Kinematics, Aerodynamics, N20 Motor Integration, 3D Printing

- Developed an insect-like ornithopter with a **15 cm body**, weighing **150–200 g**, driven by a high-efficiency N20 DC motor (600 RPM).
- Designed a crank-rod flapping mechanism delivering **20°–25° biomimetic wing stroke angles**, improving aerodynamic efficiency and lift characteristics.
- Performed **kinematic simulation** to optimize flapping frequency, torque transfer, and wing displacement profile.
- Designed custom tapered wings (12 cm span, 3 cm root chord) and fabricated them using lightweight 3D printed structures and thin aerofoil sections.
- Conducted preliminary aerodynamic analysis to evaluate thrust generation, vibration behavior, and hovering stability.
- Integrated **MPU6050 IMU + Arduino Mega + ESP8266** for real-time stabilization and wireless control testing.

Certifications

- Engineering Project Management: Scope, Time, and Cost Management
- NPTEL: Aircraft Design, Introduction to CFD
- MathWorks Training Service: MATLAB Onramp Course
- Maven Silicon: VLSI Design
- Maven Silicon: Embedded System Design
- Design Thinking: Insights to Inspiration

Education

Vellore Institute of Technology, Bhopal

Bachelor of Technology in Aerospace Engineering **CGPA: 8.32/10.0**

Relevant Coursework: Machine Design, Manufacturing Processes, Aircraft Structures, Turbomachinery, Rocket Propulsion, FEM

Aug 2022 – Aug 2026