Harsha Sista
Links: Email | LinkedIn | Website

Research Interests: Aerodynamics, Computational Fluid Dynamics, Propulsion, Rotorcraft Dynamics, Numerical Methods.

Education

Bachelor's in Engineering in Mechanical Engineering (CGPA: 7.47/10.0)   **BITS Pilani**
Hyderabad, India   *2016 – 2020*

Skills

- **Mechanical:** ANSYS - Workbench, Fluent, ICEM | ABAQUS | Solidworks | Fusion 360 | CREO | AutoCAD | Keyshot | Tecplot | COMSOL
- **Programming:** Java | C++ | MATLAB | MS Office | LaTeX | Python (elementary)

Experience

BITS Pilani, Hyderabad Campus   **Jan 2020 – Present**
Research Assistant   *Hyderabad, India*

- Under Prof. K.R.C Murthy, Assistant Professor and Prof. Y.V.D Rao, Professor, Dept. of Mechanical Engineering.
- Designed a novel laparoscopic surgical device that combines the functionality of a forceps, a suction-irrigation apparatus and a Carbon Dioxide insufflator. The design has been formalized as an Indian Patent Application.
- Simulated the flow physics of blood as a non-newtonian fluid within the annular region of the device in ANSYS Fluent, in order to simulate actual surgical conditions, using various non-newtonian models.
- Currently working on the Multiphase simulations through the device for a mixture of water and Carbon Dioxide through the annular region, for different volume fractions.

Politecnico di Milano   **Jul 2019 – Dec 2019**
Research Assistant   *Milan, Italy*

- Under Prof. Luigi Vigevano, Associate Professor at the Dept. of Aerospace Engineering.
- Aerodynamic study of the flow field around the fuselage and tail rotor of a helicopter.
- Generation of the mesh for the geometry and simulation on the in-house navier-stokes based CFD code, ROSITA.
- Implementation of the results of this aerodynamic study for aeroelastic purposes and the objective of noise reduction by the rotorcraft.

Indian Institute of Technology, Kharagpur   **Jul 2019 – Dec 2019**
Research Assistant (Summer Intern)   *Kharagpur, India*

- Under Dr. Sourav Mitra, Assistant Professor, Dept. of Mechanical Engineering.
- Flow simulation of supercritical carbon dioxide through a channel on ANSYS FLUENT.
- Extracted property tables using NIST REFPROP software and linked it to FLUENT while setting up the simulation.
- Ran the simulation at the critical parameters and analysed the flow behaviour and development of a flow profile.

National Aluminium Company, Mines and Refinery Complex   **May 2018 - Jul 2018**
Summer Intern   *Damanjodi, India*

- The Mines and Refinery complex works towards processing the raw Bauxite into Alumina, which requires steam at a particular pressure as part of the process.
- Learned about the working of the Steam and Power Plant (SPP), which produces the steam at required pressure.
- Successfully selected a Centrifugal Pump for Industrial use for the SPP.

Projects

○ **Design and Fabrication of a Model Airplane** **Aug 2018 – Apr 2019**
Course Project for Production Techniques 1 and 2

  - As a group project, we had to design and fabricate something using one or more production techniques taught to us in the course, so we decided to design an airplane and 3D print it part by part before assembling it.

○ **Simulation of Fluid Flow through a Rocket Nozzle** **Aug 2018 – Dec 2018**
Course Project for Rocket and Spacecraft Propulsion

  - I designed a rudimentary nozzle geometry and simulated the flow of gas on ANSYS Fluent, plotting the Mach number, velocity and pressure contours in the process.

○ **Numerical Simulation and Analysis of Friction Stir Welding** **Aug 2018 – Dec 2018**
Formal Project

  - The aims of the project was to simulate the Friction Stir Welding Process using ABAQUS software in order to obtain an Asymmetrical Thermal and Strain profile around the tool pin.

○ **Simulating Aerodynamic Loads on Large HAWT blades** **Jan 2018 – May 2018**
Course Project for Mechanical Vibrations

  - Designed and simulated the effects of vibrations on a horizontal-axis wind turbine (HAWT) on ANSYS.

Competitions

○ **Hyperloop India** **Sep 2017 – Present**
Participated in the SpaceX Hyperloop Pod Competition

  - **2020 (halted due to COVID 19):** Was helping with the setup and theory behind CFD simulations as an advisor.
  - **2019:** Was the Renders and CAD Lead, supervising the creation of the CAD models for the various subsystems of the full-scale prototype and creating renderings for the same.
  - **2018:** Simulated propulsion system components and designed the pneumatic braking base station for the pod, which aimed to achieve speeds in excess of 450 kmph and handle deceleration of upto 3.5 g.

○ **CANSAT** **Oct 2017 – Feb 2019**
A design-build-fly competition organized by the American Astronautical Society

  - **2019:** Led a team of 10 students to design and develop a prototype of a working satellite. I ensured that all the subsystems worked within the parameters of each other and optimisation of the structure where possible.
  - **2018:** My responsibilities as a member of the mechanical subsystem included handling the mechanical design of the prototype as well as making sure all the requirements of the design were met.

○ **SAE BAJA India 2019** **Jan 2018 – Sep 2018**
Core Member of Powertrain Team

  - Designed a Roll Cage for the ATV, computed the power required, CVT and Gear Ratios, torque and gradeability.

○ **MegaATV Championship 2018** **Oct 2017 – Apr 2018**
Core Member of Powertrain Team

  - Calculated the maximum torque, gradeability, power required and CVT ratio in addition to fabricating mounts for the engine, manufacturing the Roll cage and testing the engine for the all-terrain vehicle.

Patents, Publications and Conferences

Patents

Title: Laparoscopic Surgical Device *IN Patent Application: 202011034072*

○ The device combines the functionality of a forceps, a suction-irrigation apparatus and a Carbon Dioxide insufflator.

Conferences

○ **SWAYAM 2020:** A Versatile Reusable Laparoscopic Instrument for Minimally Invasive Surgeries (Accepted, conference delayed due to COVID-19). **Link**
○ **IPROMM 2020:** Challenges in the design of a modified laparoscopic surgical forceps (Accepted, conference to be held online in Dec 2020). **Link**