

Sudarsana Nerella

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Profile

Aerospace engineering student with hands-on motorsport experience and expertise in CFD, aerothermal analysis, and propulsion systems. Background in high-speed flow physics, thermal management, and vehicle aerodynamics development.

Education

M.S. Aerospace Engineering, Virginia Tech, USA

2024 – Present

B.Tech Aerospace Engineering, UPES, India

2019 – 2023

Skills Summary

- Programming:** Python, C, C++, Fortran, Mathematica, MATLAB
- CFD & Modeling:** OpenFOAM, ANSYS Fluent, SU2, COMSOL, XFLR5
- Software & Tools:** Simulink, STK, PX4, Fusion 360, CATIA, Adobe Creative Cloud
- Domains:** Propulsion, Vehicle Aerodynamics, Thermal Management, Combustion
- Languages:** English, Telugu, Hindi, Spanish

Experience

Research Assistant

Advanced Propulsion and Power Laboratory (APPL) – Virginia Tech

2024 – Present

Blacksburg, VA

- Propulsion Aerothermochemistry:** Research on high-enthalpy propulsion systems with emphasis on solid-fuel combustion physics and regression dynamics.
- Combustion Modelling:** Investigating polymer degradation, turbulent flame–surface interactions, and heat-release behaviour in solid propellants.
- Aerothermal Analysis:** Flow characterisation, plume dynamics, and heat-flux prediction in high-temperature, high-pressure propulsion systems.

Research Assistant

Team Dirt Marshalls (Go-karting)

Jan 2021 – Feb 2022

Delhi, India

- Aerodynamic Development:** Designed bodywork geometry for racing vehicle; collaborated with powertrain group on cooling integration.
- CFD Analysis:** Conducted drag reduction and thermal management studies; iterated designs through simulation-to-prototype cycles.
- Cross-Functional Collaboration:** Worked with fabrication team to translate CFD results into manufacturable components.

Intern

DRDO – Young Scientist Laboratories

2022

Hyderabad, India

- HITL Simulation:** Developed hardware-in-the-loop simulations for swarm-drone control architectures using MATLAB/Simulink.
- Control Systems:** Designed and tuned attitude-control loops for UAV guidance and performance validation.
- Subsystem Modeling:** Built propulsion and control subsystem models for embedded applications.

Research Associate

Team Odessey

2021 – 2022

Dehradun, India

- Mission Design:** Designed dual-satellite mission concept for Van Allen radiation belt observation.
- Systems Development:** Built low-cost altitude-determination subsystem matched to model predictions.
- International Presentation:** Presented mission architecture at SSTL Singapore Challenge.

Projects & Research

- **Numerical Simulation of Pintle Injectors with Expansion-Deflection Nozzle:** Performed CFD simulations using OpenFOAM and ANSYS Fluent to study flow dynamics in pintle-injector configurations; evaluated injector–nozzle interaction for performance, stability, and mixing characteristics.
- **Dual-Satellite Architecture for Van Allen Belt Studies (SSTL 2021):** Designed two-satellite constellation to observe charged-particle distributions across radiation belts; modeled radiation-belt variations under solar-storm conditions.

Publications

- **Ballistic Capture Dynamics and Trajectory Optimization for Observation of Enceladus** – Accepted for presentation at AIAA SciTech Forum 2026, Space Exploration Technologies. *Authors: Nerella, Dr.Samantha Kenyon, & Shetty, N.*
- **Mechanistic Model of Polypropylene and Polystyrene Solid Fuel Combustion for Supersonic Propulsion** – Accepted for presentation at AIAA SciTech Forum 2026, Propellants Session PC-16. *Authors: Nerella, Dr.Lucca Masa, et al.*

Honors & Awards

- **Indian Karting Race 2021** – Championship Winner (Engine Design Team)
- **Best Mission Award** – Brahmastra Aerospace Systems (Orbital Nano debris-mitigation mission)
- **Singapore Space Challenge (SSTL)** – Selected for presentation of dual-satellite Van Allen belt mission

Leadership & Outreach

Onboarding Team Member

SGAC (Space Generation Advisory Council)

2025 – Present

Global

- Assist with volunteer onboarding and communication support for incoming members across global working groups.

Chapter Officer

Infinity Space Club

2020 – 2023

Dehradun, India

- Led coordination of seminars, talks, and outreach events on space science; increased engagement through programming and promotion.