

# A U Nachiketh Kumar

## Aerospace Engineering Undergraduate | Research Intern

🇮🇳 Indian 📞 +91 9606299177 ✉ nachiketh41@gmail.com in a-u-nachiketh-kumar 🌐 nachikethkumar

### 📄 PROFILE

Aerospace undergrad with keen interest space engineering, hypersonic flows, and design of space and air vehicles. Actively involved in diverse research endeavors within aerospace engineering domain. Dedicated to pioneering next-generation innovative technologies in aerospace that drive significant societal impact.

### 📁 PROFESSIONAL EXPERIENCE

#### Aeronautical Development Agency, DRDO,

Flight Mechanics and Control Division, Summer Internship

May 2023 – June 2023 | National Aerospace Laboratories (NAL)

- Developed computer vision algorithms for runway path planning and tracking during the descent and landing of fighter aircraft
- Motion estimation utilizing optical flow algorithms.
- Study on fighter aircraft control laws and flight data analysis.

#### GENEX Space, R&D Intern

January 2023 – February 2023 | Bangalore, India

- Product Design and Prototyping using CATIA and Fusion 360.
- Involved in developing new prototypes for CANSAT's and initiated testing, analysis for optimal performance.
- Developed software application for its telemetry enabling real-time monitoring and analysis of critical mission data.

#### Indian Institute of Technology, Kanpur, Dept. of Aerospace Engineering,

Research Student

August 2023 – present | Kanpur, India

- Fluid Structure interaction (FSI) Numerical study on aeroelasticity and FSI using partitioned approach is simulated.
- Numerical study of hypersonic flow over shock generator, calculation of aerodynamic data, using FLUENT and open source SU2 solver.

### 📁 PROJECTS

#### Novel vision based path-planning algorithm for minidrone using MATLAB Simulink

June 2022 – October 2022

- Developed flight code for precise path-planning using computer vision algorithms.
- Performed Software In the Loop Simulations to test autonomous flight code in virtual environment.
- Performance testing and analysis by deploying code on parrot MAMBO hardware

#### Development of Deep-Learning model for runway classification and aerial vehical detection using transfer learning approach

July 2023 – October 2023

- Built a robust deep-learning model for runway and aerial vehicle detection.
- Employed Transfer Learning to pre-trained CNN network (ResNet, GoogLeNet).
- Comparison of training algorithms (SGD, Adam, RMSProp) for optimal performance.

#### Study of Hypersonic flow and Heat-Transfer over Blunt cone flare body (DART) Winged Re-Entry Vehicle

November 2022 – present

- Numerical simulation of hypersonic flow over blunt body, winged Re-entry vehicle.
- Calculation of aerodynamic data, heat transfer, qualitative results using FLUENT and open source SU2 solver and SU2 NEMO.
- Study on Non-equilibrium flow during the Martian re-entry was carried out.

#### Development of Autonomous drone for surveillance using PX4 and Raspberry pi

August 2023 – December 2023

- Prototype build and implemented DroneKit library to execute MAVLink protocol,
- Integrated Deep-learning models and CV algorithms on onboard computer for object detection and tracking

#### Conceptual aircraft design of water-scooping aircraft for aerial fire-fighting

November 2021 – May 2022

- Conceptualized and design of amphibian fire fighting aircraft structure
- Performed Initial-Sizing, Constraint analysis, Airfoil powerplant selection, performance parameter calculations, cost analysis etc.
- CFD Analysis and CAD design were simulated using open source solvers.

#### Design and Analysis of Hall-effect thrusters

- Literature and preliminary studies on electric propulsion and plasma physics.
- Built MATLAB for analyzing and calculating Thruster Sizing and performance parameters .
- Created CAD designs for Prototype building and testing

### 🧠 SKILLS

**Languages/Tools** (MATLAB, Simulink, Python,C++ Programming GUI, Stateflow, Computer Vision, Deep-Learning, Image Processing, Model based Design)

**Modelling** (CAD Design, CATIA V5,Autodesk Fusion 360, Grid tool GAMBIT, ICEM, Aircraft Design, SITL)

**Solvers** (ANSYS, FLUENT, Nastran Patran, Flight Gear, FEMM, SU2, Open VSP, XFLR, Open Rocket)

**Platforms** (Operating system Linux, Windows, Microsoft office,Raspberry Pi, 3D Printing, Cura, Paraview, Qg Control, Ardupilot, PX4, Flight gear)

**Soft Skills** (Exceeded expectations, tackled, demonstrated initiative, self-motivated, reliable, driven, Collaborated effectively)

### 🎓 EDUCATION

#### Bachelor of Tech in Aerospace

**Engineering**, M S Ramaiah University of Applied Sciences

2020 – present | Bangalore, India

CGPA: 9.34

#### High School, Indraprastha PU College

2018 – 2020 | Uppinangady, India

Physics, Chemistry, Maths, Biology

### 📄 PUBLICATIONS

**National Symposium of Shock Waves (NSSW-2023)**, PRL Ahmedabad, India  
Computational study on hypersonic flow over winged re-entry module for Heat flux prediction using SU2

**4th International SU2 conference, 2023**, Varenna, Italy  
Assessment of thermochemistry modelling of hypersonic non-equilibrium flow in martian atmosphere using SU2 NEMO and Mutation ++

### 🏆 AWARDS

**National Child Award in Innovation**, Government of india

**Nat Geo Explorer Award**, National Geography, GOOGLE

**Global Finalist**, Google Science Fair

**Silver Medal**, International Engineering Olympiad

**Gold Medal**, Indian Science and Engineering Fair

**All India Top 5th Place**, Mini-Drone Coding Contest, Mathworks

**2nd Place**, Autodesk Design Hackathon

**Young Scientist Award**, Kannada and Cultural Dep't,Bangalore

**National Finalist**, Aeronautical Society of India

**University Student Achiever**, MSRUAS