JOTHIKA KUMAR

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Education

Delft University of Technology, Netherlands **Sept 2024 - Present**
Master of Science in Aerospace Engineering GPA: 8.2/10

- **Coursework:** Aerospace Structures and Materials (Design and Safety of Structures Profile)

National Institute of Technology, Tiruchirappalli **Aug 2020 - May 2024**
Bachelor of Technology in Mechanical Engineering CGPA: 9.56/10

- **Department Rank:** 2/133
- **Related Coursework:** Structural Mechanics, Finite Element Method, Fluid Mechanics, Thermal Engineering

D.A.V Public School, Velachery, Chennai **April 2019 - March 2020**
Class XII CBSE Board Percentage: 97.6%

Relevant Experience

Research Project, Delft University of Technology **Jan 2024 - Present**
Project: Parametric Finite Element Analysis of Structures with Inclusions *Under Prof. Christos Kassapoglou*

- Working on creating a **parametric finite element model in Abaqus** to examine a plate under far-field tension containing circular inclusions to gain insights about stress distribution in a composite matrix with circular fibers.

Bachelor Thesis, National Institute of Technology, Tiruchirappalli **Dec 2023 - May 2024**
Project: Numerical Modeling and Analysis of Flexible Heat Pipe for Space Applications *Under Prof. Dr. Suresh S*

- Simulated **boiling and condensation** in thermosyphon using ANSYS FLUENT with multiphase models, extending to heat pipes with porous media model to analyze evaporation, condensation, and **capillary action**.
- Investigated the **impact of pipe bending** (0°–90°) on performance under varying water **fill levels** and **power inputs**.
- Validated numerical results against experimental data, achieving a close match **(17% difference)**, highlighting reduced thermal conductivity with increased bending angles.

Summer Research Internship, RWTH Aachen University, Germany **May 2023 - Sept 2023**
Project: Analysis of Thermal protection system of reusable launch vehicles *Under Prof. Dr.-Ing. Kai-Uwe Schröder*

- At the Institute of **Structural Mechanics and Lightweight Design**, I performed structural and thermal simulations in **OpenFOAM** for a **composite** of **PCM** and **lattice structure** sample by varying heating orientation, cell size, and gravity, according to **re-entry conditions** to determine the **effect of convection** on thermal performance.
- Updated the **custom PCMLattice solver** to the latest OpenFOAM version using C++ in Ubuntu.
- Analyzed Temperature-Time-Liquid Fraction plots, observed **reduced melting time** with increased gravity, and investigated Rayleigh-Bénard convection cells using ParaView, Python, and Julia scripts.

Research Internship, Indian Institute of Technology, Bombay **May 2022 - Dec 2022**
Project: Design and Analysis of Amphibian Aircraft *Under Dr. Dhwanil Shukla*

- Carried out an extensive literature review on **amphibian systems** capable of takeoff and landing on water and land.
- **Led a team** of six students working on design, analysis, propulsion, control, and communication aspects.
- Designed CAD model of **telescopic wing** with a retracting mechanism for various wing planforms in SOLIDWORKS.
- Modeled an **fuselage integrated with a one-step hull design** and performed **structural analysis** in ANSYS.

Skills

Programming Languages & Computer Tools: Python, MATLAB, Julia, C, C++, Simulink, SQL, MS Office
Engineering Software: ABAQUS, ANSYS, OpenFOAM, Paraview, SOLIDWORKS, COMSOL, Fusion 360, XFLR5
Graphic Design Tools: Adobe Photoshop, Adobe Illustrator, Autodesk Sketchbook, Procreate
Soft Skills: Effective teamwork, leadership, critical thinking, strong communication, and organizational abilities.
Languages: English (professional), Tamil (native), Hindi (regional), French (beginner).

Projects & Competitions

Cyclocopter Bin | *Sangam, Pragyan Techfest '23* **Dec 2022 - May 2023**

- Engineered a **waste collection drone** with four **cyclorotors**, utilizing **image processing techniques** to map regions of high floating waste and remove it from the surface water effectively.
- Designed a detailed CAD **assembly of the cyclocopter** and analyzed the flow-lift and drag attributes in ANSYS.
- **Fabricated the model** and successfully tested the cyclorotor technology with **3D-printed materials**.

Multirotor Drone | *SAE AeroTHON '22* **April 2022 - Nov 2022**

- Developed a **quadcopter** with **targeted payload delivery** capabilities and integrated image processing for advanced **surveillance** applications.
- Designed drone **CAD model** with **Hybrid X frame** in SOLIDWORKS; conducted **topology optimization**; performed **structural analysis** in ANSYS.
- Fabricated the drone using a **carbon fibre-balsa composite structure** using the **vacuum bagging technique** and successfully tested it.

Albatross | *Sangam, Pragyan Techfest '22* **Nov 2021 - March 2022**

- Developed a self-sustainable, efficient **glider that detects forest fires** using image processing and alerts base station.
- Spearheaded a six-membered team and worked on the CAD Model of the **wing and curved fuselage**, fabrication of the plane and successfully **published** as a research article in **AIP Conference Proceedings.**

Positions of Responsibilities

Events Commissioner | **Enlightness** | *TU Delft* **Oct 2024- Present**

- Responsible for organizing technical workshops, mentorship programs, and the **annual career event** to aid master's students in the faculty of Aerospace.

Vice President | **The Third Dimension Club** | *NIT Trichy* **Aug 2021- May 2024**

- Led a team of 45 **aviation** enthusiasts to undertake research projects and participate in nationwide competitions.
- **Senior lead** in projects involving structural mechanics, material analysis, composites and design of UAVs.

Senior Graphic Design Manager | **Graphique** | *NIT Trichy* **Aug 2021- May 2024**

- Worked on projects, posters, and competitions **as a digital artist** in the university's official graphic design club.

Awards & Scholarships

- Secured **2 NL Scholarships** in TU Delft to cover living expenses for the first academic year.
- Secured the competitive **KC Mahindra** interest-free loan scholarship, awarded for exceptional academic and extracurricular achievements, ranking **among the top 90 students** nationwide.
- Awarded the highly prestigious **DAAD WISE Scholarship**, ranking among the top 150 students in India, to pursue a **fully-funded research** internship in **Germany**.
- Received the esteemed **OPJEMS Scholarship '23**, ranking **among the top 80 students** in India. It is a recognition earned through nomination based on top academic performance, followed by a rigorous multi-stage selection process.
- Selected for the highly competitive **MITACS Globalink Scholarship** to pursue a fully-funded research intern in **Canada**.
- Received **Institute Award** for outstanding academic performance, achieving the **1st rank** in the Mechanical department and the **2nd rank** in the university during the academic year 2020-21.
- Secured **10th position nationwide** in the Phase-1 design round of the **SAE Aerothon '22** competition.
- Received **gold medals** for general proficiency in 10th grade, encompassing **Best Outgoing Student, Best Outgoing in Cultural, Young Scientist Award** and **1st rank** in district.
- Selected as **top two** among 250 students and awarded a stipend for the **RSI-C summer program** at IITM, organized in consultation with the prestigious **RSI by CEE** and **MIT** in the USA.

Publications

Autonomous Multi-Rotor UAVs: A Holistic Approach to Design, Optimization, and Fabrication **In Press**

- Presented paper at the International Conference on Advances in Mechanical and Aerospace Engineering **(ICAMAE)**.
- Manuscript is accepted to be published in **Journal of Aeronautics, Astronautics and Aviation.**

Albatross: Unmanned self-sustainable glider for forest fire detection | *Link* **Sept 2022**