HARSHA VARDHAN MUGUNDHAN Bristol, BS7 9YG, UK |+44 7393068839 | harish61298@gmail.com |

Professional Summary

Aerospace- Mechanical Engineer specialising in autonomous Unmanned Aerial Vehicles(UAV) systems and robotics, with hands-on experience in control system design, mission simulation, Computer Aided Design and regulatory compliance. Skilled in developing and validating AI-enabled navigation algorithms using ArduPilot, Mavlink, and Python, with real-time integration into ground control software and X-Plane simulation environments.

Proficient in mission-critical systems engineering, with experience adapting UAV operations across UK, UAE, and Indian regulatory contexts. Proven track record in leading and contributing to projects including the IMechE UAS Challenge, alongside patent-pending innovations in aerospace mechanics and microgravity systems.

Combines technical rigor with strategic thinking and a systems-level understanding of modern aerospace technologies. Actively seeking to contribute to mission-ready autonomous platforms and next-generation defense systems with focus on agility, safety and compliance. Have the legal right to work in the United Kingdom without sponsorship.

Education

Master of Science in Aerial Robotics *September 2023- December 2024*

University of Bristol, Bristol, United Kingdom

- Specialised in robotics systems, aerospace dynamics, and Artificial Intelligence applications, with a focus on solving complex operational challenges.
- Engaged with advanced control and navigation research through EuroGNC 2024, fostering insights into complex systems integration.
- Online Course:
  - Completed Systems Engineering (16.842) course by Prof. Oliver de Weck – MIT OpenCourseWare where I learnt advanced systems engineering concepts including system architecture, integration and lifecycle management. And currently pursuing INCOSE's Associate Systems Engineering Professional (ASEP) Certification.
- **Key Projects:**
  - Developed a Mission Clock for Intuitive Drone Control Interface for Search and Rescue (SAR) using Python with Tkinter Library and identified usability issues and visual hierarchy in the Human- machine interface through heuristic evaluation.
  - WingedSentry: Collaborated with a team of seven and Led the UAV design and integration of GPS with MAVLink on Raspberry Pi for autonomous navigation. Designed and 3D-printed a custom payload release mechanism to deploy a camera trap mid-air onto a target box, enabling precise, real-time wildlife monitoring.
  - IMechE UAS Challenge 2024:
    - Collaborated with a team of six to develop and implement navigation algorithms for a custom-built autonomous UAV.
    - Integrated real-time control and status updates into a local ground station using ArduPilot Mission Planner software.
    - Contributed to the implementation of a manned quadcopter model in X-plane 11 simulation software to validate navigation algorithms in a realistic simulation environment.
    - Gained hands-on experience in drone navigation systems, autonomous control, and advanced simulation tools.

Bachelor of Engineering in Mechanical Engineering *August 2016- October 2020*

Anna University, Chennai, India

- Deep exploration of my passion for science and engineering including foundation in engineering mathematics, thermal engineering, fluid mechanics, mechatronics, solid mechanics, machine design, material science, metrology and measurements and operations research.
- Building foundation on Computational Fluid Dynamics and understanding of various research methodologies to aid my research goals in aerodynamic steering system.
- Assisting research on alternate fuel since my second year with my professor and co- authored a paper on Performance study of waste transformer oil in diesel engines. During which I gathered immense knowledge on engine performance study, research methodologies and experimental comparison on various blends of alternate fuels such as Waste Transformer Oil (WTO) with that of conventional fuels like petrol/gasoline and diesel.
- **Key Projects:**
  - Independently participated in the **NASA's Lunar Loo contest** and submitted a solution with a state-of-the-art *"Human Excrement Collection and Storage Device for Microgravity Space"*(patent pending).
  - Implementation of **Lean manufacturing** methodology in an automotive manufacturing industry to reduce wastes such as operator motion, excess processing through development of new tools and systems for productivity improvement. Tools such as Value stream mapping (VSM), Materials Requirements Planning (MRP), CATIA V5 and MODAPTS were used to reduce the Non-value added activities by 8.429% from 36.402% to 27.973% across the successfully implemented stations.

- Participated in the **National level Karts Design Challenge** with a 25- member team and lead the Powertrain development team into comparing multiple engines and tuning them based on performance analysis.
- Participated in the **e-Yantra competition (eYRC- 2019-2020)** and designed a underwater "Patrol fish" that bio-mimics different locomotions of a fish. The robot replicates the natural movement of a fish's muscles by using multiple servo actuated joints that are connected to each other. Challenges include waterproofing the electronics, design to trigger the buoy and motion study of the joints using Fusion 360 CAD software.
- **Design and fabrication** of a mechanism to load a spring with minimal effort through effective use of multiple springs for use in various mechanical operations such as punching and piercing.
- Co-authored a paper titled *"Performance study of Waste Transformer Oil in Diesel engine*" and won *Best Paper Award* at **ARIME- 2018**.
- Design and fabrication of **Hybrid power generation system,** a unified system combining wind and solar energy.

Experience

Sales Assistant (Part-Time) *February 2025- Present*

Rontec (Esso), Bristol, UK

- Certified competent person in fuel safety, spill containment, fire procedures, and emergency response.
- Certified in legal compliance, hazardous substances handling, and retail fuel operations.
- Assist customers, process transactions, and handle fuel sales.
- Manage stock, maintain store cleanliness, and support promotions.

Trade Assistant (Part-Time, Contract) *November 2024- January 2025*

Sainsbury's Local, Bristol, UK

- Provided excellent customer service and handled transactions, returns, and refunds.
- Managed inventory with attention to detail, ensuring accuracy and minimising discrepancies.
- Maintained a clean, organised workspace, demonstrating reliability and process improvement.
- Collaborated in a fast-paced team, enhancing communication, problem-solving, and time management skills.

Independent researcher *March 2020- August 2023*

Self- employed, Chennai, India

- Conducted research on aerodynamic steering systems and race car performance enhancement.
- Leveraged innovative approaches to simplify complex aerodynamic challenges, maximising outcomes with minimal resource use.

Proprietary Trader *August 2020- July 2023*

Self- employed, Chennai, India

- Managed investment strategies with a focus on equity trading, sector analysis, and market sentiment evaluation.
- Applied data-driven decision-making to optimise portfolio performance and identify growth opportunities.
- Known for developing simple, effective strategies to manage and mitigate risk under dynamic market conditions.

Industrial Engineering Intern *January 2020- March 2020*

Ford India Pvt. Ltd., Chennai, India

- Project: *"Identification and Elimination of Muda through Lean Management System in an Automobile Manufacturing Industry."*
- Optimized kitting layouts, achieving an 8.429% reduction in non-value-added activities in the Engine Dressing Area.
- Recognised with the "Spot Recognition Award" for designing practical, efficient solutions to improve productivity.

Technical Skills

- **CAD & Simulation Tools:** CATIA V5, SolidWorks, Siemens NX, Fusion 360, AutoCAD, Ansys Fluent, SolidEdge, Keyshot, Blender, Unreal Engine, X-Plane 11.
- **Programming & Software Integration:** Python with Tkinter, PyQt, Matplotlib, scikit-learn, XPlaneConnect, pyserial, tensorflow and OpenCV, C, C++, MATLAB (control systems, simulations, data analysis).
- **UAV Systems & Robotics:** ArduPilot Mission Planner, Mavlink, PX4, Arduino, Raspberry Pi, UAV path planning, real-time control systems, GPS integration, payload mechanism design.
- **Systems Engineering & Compliance:** SysML, MBSE methodologies, CAP 722, Lean Manufacturing (Kanban, Kaizen).
- **Productivity & Creative Tools:** Microsoft Office Suite (Excel, Word, PowerPoint), Adobe Creative Suite (Photoshop, InDesign, Illustrator, Premiere)

Patents

- Spring Loading Mechanism with Multiple Springs: Applicable in creating more efficient mechanical load-bearing components (Patent pending).
- Human Excrement Collection and Storage Device for Microgravity Space: Innovations in waste management applicable to long duration missions, adaptable for space missions (Patent pending).

Certifications and Licenses

- CAA Flyer ID: **GBR-RP-G4F4LPR2NTJK** – UK Civil Aviation Authority (Valid till 13/02/2030)
- Certificate of completion in MATLAB - LIVEWIRE (Jun 2018)
- Certificate of completion in Solidworks - CADD Centre Training Services Pvt Ltd. (Jun 2018)
- Certificate of completion in AutoCAD 2D - CADD Centre Training Services Pvt Ltd. (Mar 2017)

Languages

English (Native), Tamil (Native), French (Beginner).

Interests

- Strategic Thinking: Enhanced analytical and decision-making abilities through simulation gaming, fostering a strong aptitude for planning and scenario analysis.
- Team Leadership and Resilience: Cultivated leadership, teamwork, and adaptability through outdoor activities like trekking, sailing, gliding, rowing, and kayaking, aligning with collaborative and high-performance work environments.
- Focus and Individual Performance: Strengthened problem-solving, attention to detail, and independent project management skills through activities such as table tennis, badminton, archery, and karting.