OM ANANT KULKARNI

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Highlights

- *Enthusiastic learner of robotics and mechanical engineering with a keen interest in the space tech industry.*
- *Currently working as a Research Fellow at ISRO-IIST in Electric Propulsion domain.*
- *Completed Bachelors in Mechanical Engineering as Major and System Engineering as Honours with distinction.*
- *Worked as a research intern at ISRO-SAC and DRDO-DIAT.*
- *Part of the team which develops an autonomous robotic systems in ABU Robocon competition and secured AIR 3 in year 2022.*
- *Received Patent (Pt. No.: 545629) for final year project and also received the most commendable project award for the same.*

Work Experience

ISRO- Indian Institute of Space Science and Technology | *Junior Research /Project Fellow* **Jan 2024 – Present**
Location: Thiruvananthapuram, India

- Designing and developing an Integrated Diagnostic Module (IDM) payload comprising of Quartz Crystal Microbalance (QCM), Retarding Potential Analyzer (RPA), and Faraday Probe sensors for the Hall Effect Thrusters in TDS satellite (Technology demonstration Satellite-01) mission of ISRO. Conducting structural and thermal analysis to ensure space qualification and launch compatibility.
- Performing different analysis, to understand the performance of Xenon-based Hall Effect Thrusters using tools like VSim(Particle-in-Cell), ANSYS, and MATLAB. Analyzing test data from experiments performed in our vacuum chamber facility and working on automating in-chamber diagnostics through the use of robotic systems. More Info

KPIT Technologies | *Graduate Engineer Trainee (MBD)* **Nov 2023 – Jan2024**
Location: Pune, India

- Improved my skills of C++ and MATLAB Programming.
- Followed Agile development methodology and improved my teamwork skills.
- Worked on the Model based design of the systems for autonomous driving project using MATLAB. More Info

DRDO's Defense Institute of Advanced Technology (DRDO-DIAT) | *Research Intern (Part Time)* **Oct 2023 – Dec2023**
Location: Pune, India
Guide: Dr. Amrita Nighojkar

- Conducted a research on sensor fusion optimization algorithms for autonomous navigation and Advanced Driver Assistance Systems (ADAS). Also, researched the optimized layout development for Pseudolites navigation system of UAV.
- Modelled a Mask Region-based Convolutional Neural Network (R-CNN) for real-time defects positioning and classification on jet aircrafts using UAV's. (Successfully developed and trained the entire model predicting with accuracy of 95.76%). More Info

Self-Learning **Jul 2023 – Sept2023**
Location: Pune, India

- Completed an online training cum internship program at Pravi.co in C programming.
- Successfully achieved a Champion level in C programming during this period. Certificate Link
- Focused on gaining hands-on experience of GMAT and STK software.
- Additionally put efforts on crafting a research paper based on the work conducted during my internship at SAC-ISRO and my bachelor's thesis

ISRO-Space Application Centre | *Research Intern* **Jan 2023 – Jun 2023**
Location: Ahmedabad, India
Guide: Shri. Prempal Kumar (Sci/Engr -SD)

- Primarily researched the design and automation of precision alignment mechanisms for ground Manpack Antennas in Ka-band SATCOM, as well as deployment structures for flexible antennas in diverse space applications.
- Conducted analysis and testing of various composites for space applications, undertaking practical studies and FEA analysis using industry-standard tools like HyperMesh, Abaqus and Matlab. Acquired significant insights into composite mechanics, contributing to project optimization and enhanced performance. More Info

Team Automatons - ABU-ROBOCON | *Mechanical Designer, ROS Engineer* **May 2021 -Oct 2022**
Location: Pune, India

- Worked on the control system and operating software for autonomous navigation of four-wheeled Omni drive and four-wheeled swerve drive used in ABU-ROBOCON competition. (Successfully performed the SLAM navigation.)

- Performed diverse analyses on multiple mechanisms crafted using SolidWorks and Fusion 360 on computational software like Ansys (FEA), MATLAB, and ROS. Additionally, I had the opportunity to enhance my technical skills and gain valuable teamwork experience. More Info

Yantra byte Foundation | *Machine learning Intern* **Nov 2021 -Jan 2022**
Location: Delhi, India

- It was a 2 month machine learning internship where I learned machine learning in depth and also develop a project of Ml based Travel Planner (Project Link). More Info

Education

B.E Mechanical Engineering (Hons. System Engineering) **2019-2023**
Savitribai Phule Pune University, Pune, Maharashtra, India
Final grade: *First Class with Distinction with Honors*
Thesis: *Design and development of autonomous ground vehicle for weed removing purpose(Most Commendable Project Award for Thesis)*

Working proficiency

Software: ROS, SolidWorks, Siemens NX, HyperMesh, Ansys, MATLAB, Simulink, Adams, CopelliaSim, Arduino, CAMEO, GMAT, LATEX
Hardware: Jetson Nano, Arduino, Raspberry Pi, Retarding Potential Analyzer, Quartz Crystal Microbalance (QCM)
Programming: Python, MATLAB, C, C++
Fabrication: Composites, 3d printing

Publications, Awards and Conferences

- **[07/2024] Patent Granted**
  The Patent Office, Government of India: *Received patent for my Bachelor's Thesis titled "Design and development of autonomous ground vehicle for weed removing purpose "from The Patent Office, Government of India: 545629 (Patent Certificate)*
- **[09/2024] Research Paper under publication**
  Springer Journal of Environmental Monitoring and Assessment (EMA): *The research paper titled "Machine learning-assisted prediction of engineered carbon systems' capacity to treat textile dyeing wastewater via adsorption technology is under publication. I worked on this paper at DRDO-DIAT, along with my major research topics.*
- **[08/2023] Presented Research Paper at Conference**
  International Conference on Innovations in Mechanical and Civil Engineering, Pune: *Presented the research paper on my Bachelors Thesis in the 2nd I-MACE conference held on 23rd August 2023 at Pune. (Certificate Link)*
- **[05/2023] Most Commendable Project**
  Pimpri Chinchwad College of Engineering, Pune: *The award is granted to the finest patentable project displayed in Kshitij-2023, an innovative product exhibition of patentable projects (40) selected from each engineering discipline of the institute. (Award Certificates)*
- **[07/2022] Second Runner Up at ROBOCON 2022**
  DD Robocon and IIT Delhi: *It is presented to my team for achieving an All India Rank 3 in DD-ROBOCON 2022, a national-level competition held prior to ABU ROBOCON 2022, among 120 robotics teams of different Engineering institutes across India.*
- **[01/2022] National Finalist at Autodesk IDP Challenge**
  Shaastra, IIT Madras*: It was an industry design problem challenge conducted by Shaastra, IIT Madras along with Autodesk. The theme was based on the idea generation of innovative rocket designs. Over 100+ teams competed across India among which top 7 reached the finals.*

Academic projects

Autonomous Agribot for weed removing purpose (AWR) | ROS, Ansys, Image processing, Arduino, SolidWorks **Oct 2022 -Jun 2023**
Project type: Final year research project (Developed both Simulated & Hardware Model)

- AWR utilizes an agile robotic drive, which autonomously navigates in the field according to the **GPS, IMU sensor** data combined using **sensor fusion** techniques with the help of Robot Operating System (ROS) for precision agriculture. It also integrates **SLAM methodology** for adaptability to changing environments.
- We were able to generate a funding of Rs1,30,000/- through the institute's seed funding program. Selected for presentation in front of Union and State Ministry officials from the institute. Along with that a patent is also granted (App.No.202321032646) for the project. More details

Development of Alignment Mechanisms for Manpack Antennas | Composites, HyperMesh, MATLAB, GMAT **Jan 2023 – Oct 2023**

- It was the part of my internship project work at SAC-ISRO which aims to develop a motorized, compact and agile positioning mechanism for segmented parabolic reflector as well as the manual one for the Flat plate antenna that lets the antenna be mounted and automatically aimed for the SATCOM while following tight dimension requirements. (*Details of the project are not allowed to be share in detail according to the policy of the organization (SAC)).

Development of SysMl Model for AWR | MBSE, CAMEO **Feb 2023 – May 2023**

Project type: Honors course project

- The main idea of this project is to develop an entire working architecture of autonomous Agribot including robot's hardware, software modules by looking from the systems engineering point of views using the CAMEO software.
- It is developed as per the Systems Engineering standards for practical demonstration of the learnings done in my Honors Course. Info

Autonomous navigation of swerve drive by using Robot Operating System (ROS) | *ROS, Arduino, MATLAB* **Oct 2021 -Apr 2022**

Project type: Team project for ABU-Robocon (Developed both Simulated & Hardware Model)

- It is a team project on which we develop an autonomous 4 wheeled swerve drive which can navigate autonomously in varied environment without any kind of human support.
- Here I developed an ROS package and performed its hardware interfacing with the designed swerve drive to navigate according to the sensor data obtained from rpLidar A1 and depth camera sensors.

Autonomous Oil Spill Collector (AOSC)| Oleophilic Technology, ROS, SolidWorks **May 2022 –Sept 2022**

Project type: Personal Study Project (Developed a simulated model)

- AOSC is designed to autonomously detect and collect the oil spilled on the water surface. It uses fusion of multiple technologies for identifying and collecting the oil spills using belts made up of Cellulose based K-SORB's Hydrophobic Fabrics.
- A simulation of navigation is performed using ROS and external flow simulation is performed to analyze the stability of developed CAD model of the entire AOSC system. Presented in Aakruti and Dare to dream competition conducted by Dassult Systems and DRDO respectively. More Info

Basic IoT and Industry 4.0 projects | IoT, Industry 4.0 **Jul 2020 - Dec2021**

Project type: Personal DIY projects

- Done basic IOT projects related to daily life industrial and general problems which I have uploaded on my YouTube Channel ⊕

Certifications and competitions

Certifications

- CSWA-Mechanical Design by Dassault Systèmes
- Solidworks Assosiate Additive Manufacturing by Dassault Systèmes
- SOLIDWORKS 2022 Essential Training by LinkedIn
- Google Cloud Certifications
- ROS (Noetic,Melodic,Kinetic) by Udemy
- Rocket Propulsion 2021 by NPTEL
- Image Processing with MATLAB – MathWorks
- Introducing Robotic Process Automation
- Drive link for all documents Click here

Competitions

- ABU Robocon 2022 & 2021
- Autodesk Industry Design Problem Challenge by Shaastra IIT Madras and Autodesk
- E-Yantra Robotics Competition 2020 by IIT Bombay (Second Stage cleared)
- Aakruti 2021 and 2022 by Dassult Systems(Reached Presentation round)
- Dare to Dream 4.0 by DRDO
- MathWorks Mini Drone Competition 2021

Languages

- **English (C1)**
- **Marathi (Mother Tongue)**
- **German (A1)**
- **Hindi (C1)**

Interests

- **Robotics**
- **Mechanical Engineering**
- **Aerospace Engineering**
- **Astronomy**
- **Chess**
- **Cricket**
- **Badminton(Division and district Champion)**