
Kriti Verma

IIT Bombay

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EDUCATION

Indian Institute of Technology , India

2019 - 2023

B.Tech in Aerospace Engineering with Honors

Minor in Systems and Controls Engineering

INTERESTS

Controls and Dynamics , Optimization and nonlinear programming, Swarm Robotics

PUBLICATIONS

K.Jagdale, **K. Verma** , et al, "Sanket-Technology Demonstration of Antenna Deployment System on PSLV Stage 4 Orbital Platform" extended abstract presented at the 2nd National Conference on Small Satellite Technology and Applications (NCSSTA), Trivandrum, India in December 2020 and selected to be published in **Springer**.

RESEARCH PROJECTS

Modelling and Control of μ CAT for Small Satellite Applications

Advisor: Prof. Ravi N. Banavar , Systems and Controls Engineering

MAY 2021 - PRESENT

Micro Cathode-Arc Thrusters is a recent technology which has the potential to meet the requirements of the growing number of small satellite payloads.

- Surveyed the existing literature for past missions involving design and control of Pulsed Plasma Thrusters and studied the mathematical modelling of a **μ CAT (Micro Cathode-Arc Thruster)** controlled satellite
- Implemented and improved a **discrete-time control** law developed by a previous student on Python resulting in the accuracy of the order **10^{-9} rad** in the attitude
- Formulated and implemented a **nonlinear programming** problem to achieve quicker convergence using the tool CasADi with the objective of minimizing the error in attitude while maintaining the angular velocity within certain bounds
- Currently working on an **optimal control** based approach for more efficient operation

TECHNICAL PROJECTS

IIT Bombay Student Satellite Program (IITBSSP)

*IITBSSP was created with the vision of making IIT Bombay a respected centre of excellence in Space Technology. The team launched its first satellite **Pratham** in 2016. Currently consisting of **50+ students** from across disciplines, IITBSSP is engaged in designing multiple space systems.*

Electrical Subsystem, Sanket - Head

MAY 2021 - PRESENT

- Executed a **3-step recruitment** process, comprising of a written test, an interview and a mini-project to select students in the subsystem based on their technical ability, practical approach and teamwork skills
- Mentored students for 2 weeks in mini-projects in PCB design and microcontroller coding
- Guiding an interdisciplinary team of **9 students** for the development of an **indigenous**, robust, reliable and cost-effective Antenna Deployment System

Electrical Subsystem, Sanket - Design Engineer

MARCH 2020 - PRESENT

- Formulated the layout for data management and scheduling of the events of the system for different in-orbit **Operational Modes** and worked on the allocation of **Health Monitoring** data along with devising the complete **flight-code** of the system
- Analysed different system reliability models and prepared an exhaustive plan for the **Failure Mode, Effects and Criticality Analysis (FMECA)**
- Designed the Printed Circuit Board (PCB) for the Antenna Deployment System (ADS)

Remote Controlled Aircraft

Internal competition witnessing the participation of 150+ freshers to build RC Planes

- Designed and constructed a remote controlled fixed-wing aircraft from scratch using Styrofoam, considering parameters for optimum performance and flight stability

SELECTED COURSE PROJECTS

Spacecraft Trajectory Planning and Analysis

Instructor - Prof. Ashok Joshi , AE240 - Spaceflight Mechanics

- Designed a nominal trajectory of a 3-stage launch vehicle Athena to achieve the required terminal conditions for placing PICOSat 9 in a 800 km orbit
- Determined nominal burn profiles implemented lift-off, pitchover, coasting, gravity turn manoeuvres and an elliptical apogee raising orbital manoeuvre using Python

Data Analysis

Instructor - Prof. Prabhu Ramachandran , AE102 - Data Analysis and Interpretation

- Used Numpy and matplotlib to analyse different data sets : global active cases of COVID-19 till July 2019 and the annual temperature of earth's surface from 1880 to 2016

SCHOLASTIC ACHIEVEMENTS

- Secured **merit based scholarship** offered by the Defence Research and Development Organisation, India to the TOP 20 girls studying Aerospace Engineering in the country
- Awarded the Kishore Vigyanik Protsahan Yojana (KVPY) **fellowship** offered by the Department of Science and Technology, Government of India

TECHNICAL SKILLS

- Programming languages - C/C++, Python, MATLAB, Embedded C
- Software packages - MATLAB/Simulink, Solidworks, AutoCAD, Eagle, LATEX

KEY COURSES UNDERTAKEN

Controls	Mathematical Structures for Control, Signals and Feedback Systems, Linear and Non-linear systems*, Control Theory*
Aerospace	Spaceflight Mechanics, Thermodynamics and Propulsion, Aircraft Propulsion, Incompressible Fluid Mechanics, Compressible Fluid Mechanics, , Solid Mechanics, Aerospace Structural Mechanics, Vibrations and Structural Dynamics*, Aerodynamics of Compressors and Turbines*
Maths	Calculus, Linear Algebra, Differential equations, Numerical Analysis

*[*To be completed in November 2021]*

EXTRA CURRICULAR ACTIVITIES

- Participated in Versova Beach Mega **Cleanup campaign** alongside thousands of volunteers as part of the Swachh Bharat Abhiyaan (Clean India Movement)
- Participated in **pride march** conducted in the IIT Bombay by Saathi organisation
- Studied French language for **5 years** under school curriculum
- Received **Gold** medal twice in national level French Olympiad
- Completed an yearlong course in violin offered by institute under NSO

REFERENCES

Prof. Ravi N. Banavar
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Prof. Arnab Maity
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