NIKITA

(+91)8800920543 ◇ nikita99.iitkgp@gmail.com ◇ Linkedin ◇ GitHub
Fifth Year Dual Degree Student
Aerospace Engineering, Indian Institute of Technology Kharagpur

RESEARCH INTERESTS

- Space Mission Design, Trajectory Optimization, Dynamics around Small Bodies
- Spacecraft Attitude Determination and Control, Satellite Constellations
- Space Situational Awareness, Space Debris Removal and Collision Avoidance

EDUCATION

Indian Institute of Technology, Kharagpur, India *July 2018 - 2023 (Expected)*
Five year Dual degree (Bachelors and Masters in technology) Overall GPA: 8.81/10

RESEARCH EXPERIENCE AND PROJECTS

Lunar Flyby to felicitate Low-Cost Interplanetary Transfer *September 2022 – present*
Professor Manoranjan Sinha, Aerospace Engineering, IIT Kharagpur

- Mechanical analysis of multiple lunar flyby using planar CR3BP in earth-moons system.
- Devised an algorithm for low-cost earth escape by multiple gravity assist of moon to visit a specific target using Patched 2 body problem.

Coupled Orbit-Attitude Dynamics near a Binary Asteroid System *May 2022 – present*
Professor Manoranjan Sinha, Aerospace Engineering, IIT Kharagpur

- Developed a MATLAB library for CR3BP incorporating its periodic solution, their invariant manifolds.
- Implemented an algorithm for computing the fuel-optimal landing trajectories from secondary to primary asteroid leveraging the tube dynamics periodic orbits in CR3BP systems.

Space Transfers Design as Multi-Stage Decision Process *July 2021 – December 2021*
Professor Roberto Armellin, Aerospace Engineering, University of Auckland
Professor Manoranjan Sinha, Aerospace Engineering, IIT Kharagpur

- Implemented linearization of non linear 2 body dynamics using differential algebra in C++.
- Formulated and solved convex optimization problem for fuel optimal orbit raising using MATLAB and Mosek Optimization Toolbox.
- Devised an Iterative Convex Optimization algorithm to optimize the Lambert Solution for the Earth-to-Asteroid Transfer.

Hybrid Optimization of Lunar Transfer Trajectory *September 2021 – April 2022*

- Hybrid Optimization Approach, Particle Swarm Optimization to get initial solution.
- Non-Linear Optimization using Hermite Simpsons Method and 3 Body Dynamics.

ACHIEVEMENTS AND COMPETITIONS

The Boeing Scholarship sponsored by Boeing Company USA *September 2021 – March 2022*

- Awarded the scholarship under Boeing University Relations, IIT Kharagpur - Campus Engagement Program (BUR)

4th National Aerospace Conceptual Design Competition (Finalist) *Dec 2020 – June 2021*
Professor N.K. Peyada, Aerospace Engineering, IIT Kharagpur

- Conceptualized an Inter-city vertical take-off and landing air-taxi.
- Performed aerodynamics studies of the wing and airfoil and weight analysis of the fuselage using MATLAB, Pointwise, Ansys Fluent and XFLR5.
- Performed longitudinal stability and control studies of the aircraft with vectored thrust.

Microsoft Mars Rover Navigation (4^{th} Position, Team Lead) *June 2020 – July 2020*
Microsoft Mentorship Program

- Developed an interactive grid layout used to employ the path-finding algorithm using Raphael.js.
- Implemented Path Finding Algorithms (A-star, Dijkstra, Breadth-First Search and Best-first search) in JavaScript for user specified obstacle and intermediate stops.
- Used jquery and state-machine.js to enhance user interaction with the webpage.

COURSE PROJECTS

Effect of Viscosity and Density on Gravity Currents *March 2021*
Professor Sandeep Saha, Aerospace Engineering, IIT Kharagpur

- Observed the formation of gravity currents and studied the effects of changes in density and viscosity change on the currents.
- Learned the intricacies and caution of working on experimental projects by resourcefully setting up the apparatus at home during Covid Restrcitions.
- Studied the progression of boundary layer in gravity currents using image processing.

Commercial Aircraft Design and Optimization *August 2021 - November 2021*
Professor Anup Ghosh, Aerospace Engineering, IIT Kharagpur

- Defined the design requirements based on literature survey of the present status commercial aircrafts.
- Estimated the initial values of geometric and aerodynamic parameters, and performed initial sizing and weight estimate refinements.

Dynamics Modelling of a Tilt Rotor UAV *Jan 2021 – April 2021*
Professor Sandeep Saha, Aerospace Engineering, IIT Kharagpur

- Formulated the dynamical model of 6 degree of freedom for tilt rotor UAVs.
- Created the control model and developed its Simulink model for the transition phase of the tilt rotor.

Study of Pintle Injectors for Thrusters Powering a VTOL Station *Jan 2021 - April 2021*
Professor Srinibas Karmakar, Aerospace Engineering, IIT Kharagpur

- Created a CAD model of a 2D pintle injector and simulated multi-phase flow using transient CFD.

Biomimicry Inspired Multi-Winglet Design *August 2020 - November 2020*
Professor Sandeep Saha, Aerospace Engineering, IIT Kharagpur

- Simulated the multi-winglet rectangular wing using Ansys and analyzed the effect of addition of winglets and different cant angles.

TECHNICAL STRENGTHS

Languages	C, C++, Python, JavaScript, HTML5, CSS3, LaTeX
Tools	MATLAB & Simulink, Mosek, GMAT, Ansys Fluent, XFLR5, Pointwise, Github

RELEVANT COURSEWORK

Dynamics & Controls	Non-Linear Controls	Space Dynamic
	Control Theory	Systems Laboratory
Mathematics	Linear Algebra, Transform Calculus	Ordinary and Partial DE
	Operations Research(Theory and Lab)	Non-Linear Programming
Computer Science	Programming and Data Structures Theory & Lab	Algorithms-1
	Artificial Intelligence: Foundations and Applications	Image Processing

POSITION OF RESPONSIBILITY

- Aerospace Engineering Department Women Representative *September 2021 - April 2022*
- Hall General Secretory-Sports *September 2019 - June 2020*

EXTRA-CURRICULAR ACTIVITIES

- Volleyball: Gold medal in interhall, 4th position interIIT under captaincy.
- Athletics: Gold Medal in Long-run, Bronze and Silver medal in Relay.
- Drama: Stage Play in General Championship.