

K T Prajwal Prathiksh

DUAL DEGREE STUDENT · DEPARTMENT OF AEROSPACE ENGINEERING

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“The future is not to be forecast, but created...”

Education

- 2018 - **Dual Degree (B Tech + M Tech)**, Department of Aerospace Engineering, *Indian Institute of Technology, Bombay, Mumbai, India* -
- 2023* *GPA 8.85/10.0*
- 2018 **Intermediate**, JSS Public School, Bangalore, India - 95.60%
- 2016 **Matriculation**, Chinmaya Vidyalaya, Bangalore, India - 97.16%

Work Experience

Anheuser-Busch InBev

Bangalore, India

DATA SCIENTIST - B.R.E.W INTERN

May 2021 - Jul 2021

- Objective:** To reduce the **variable logistics costs** (VLC) for the **UK** and **Russian** markets, by linking underutilized shipments and creating optimum multi-load routes that adhere to business rules
- Designed **modular** python code using **open-source tools** to obtain optimized loads from underutilized shipments, and plan routes for using real-time geographical data
 - Incorporated various **business and user constraints** such as vehicle capacity, geographical priorities, one-way/round-trip requirements, freight charge and maximum transport distance and time
 - Achieved a **67%** improvement in load-linking efficiency, resulting in **8%** and **10%** reduction in the **number of trucks** and **VLC costs** respectively
 - Packaged the code as a **stand-alone executable application**, along with an **interactive documentation** view for easy access to the end-user

Technical Projects

IIT Bombay Student Satellite Program

A 70-member *student team* dedicated to the vision of making IIT Bombay a centre of excellence in space technology

Feb 2019 - Present

System Head: Star-Tracker-based Attitude Determination System (STADS)

A CubeSat-compatible attitude determination system, to be tested onboard ISRO's *PS4-OP*

- Surveyed **star-matching** algorithms based on the performance and accuracy constraints of STADS, for the identification of guide stars from the centroids of stars on an image
- Implemented **4-Star Matching** Method with a novel verification step to reduce the number of false matches, resulting in a reduction by **85%**
- Contributed to the **quality-assured Open Loop Simulation framework**, which simulates space environmental conditions to test the flight code and algorithmic blocks of STADS

Controls Engineer: Advitii

Advitii is the *2nd* satellite by IITBSSP, a technically advanced and efficient version of the first, Pratham

- Compared the accuracy and robustness of **Cowel's method** against Simplified General Perturbations Model 4 for orbit-propagation of a **Low-Earth-Orbit Satellite** in Python
- Implemented Cowel's method with a drag model and verified the results against the data from *GMAT*, an open-source tool developed by NASA

Numerical study of SPH integrators for incompressible flow

GUIDE: *Prof. Prabhu Ramachandran*, Department of Aerospace Engineering, IIT Bombay

Dec 2020 - Present

Objective: To study the effects of **numerical time-discretization schemes** on stability, accuracy and order of convergence (OOC) in **Smoothed Particle Hydrodynamics** (SPH)

- Studied various numerical time-integrators which comprised of the **Runge-Kutta**, the **Symplectic**, and the **Multi-step** classes of integrators
- Developed code to aid **reproducibility** and **multi-threaded automation** of all tests and comparison of their performance metrics for all the time-integrators against benchmark cases such as the Harmonic Oscillator, Lennard-Jones Oscillator and Taylor-Green Vortex (TGV) problems
- Studying the effects of **Courant-Friedrichs-Lewy** (CFL) number and spatial-discretization schemes of SPH on the OOC of the time-integrators

Path Optimization for Combinatorial Problems

GUIDE: *Prof. Abhijit Gogulapati*, Department of Aerospace Engineering, IIT Bombay

Jan 2021 - Apr 2021

Objective: To develop multiple **optimization tools** in order to solve a modified variant of the **travelling-salesman problem** in the context of a tourist in the **Louvre Museum**

- Devised and coded **heuristic**, **evolutionary** and **exact** algorithms for the optimization of **integer programming problems**
- Performed comparative analysis of **Genetic**, **Ant Colony**, **Simulated Annealing** and **Branch & Bound** methods to find the most **holistic tour** considering the **satisfaction** of a tourist
- Compared the algorithms on metrics such as **efficiency**, **reliability** and **quality** of solution, after validating it against *TSP* library test cases

Atmospheric-based ionic propulsion

GUIDE: *Prof. Kowsik Bodi, Department of Aerospace Engineering, IIT Bombay*

Jul 2019 - Present

Objective: To develop a **solid-state propulsion system** employing the principles of **Electrohydrodynamic (EHD)** thrust to demonstrate sustained flight as part of a three-member team

- Designed and built a **High Voltage Power Circuit (HVPC)** based on a fly-back driver capable of generating **120 kV DC**
- Surveyed numerical techniques to simulate the phenomenon of **electrohydrodynamic thrust** caused due to corona-induced ionic winds, and currently working on its implementation in **COMSOL**

Positions of Responsibility

Manager, Controls & Dynamical Systems Student Reading Group (CDS-SRG)

INSTITUTE TECHNICAL COUNCIL, IIT BOMBAY

Mar 2020 - Mar 2021

- Conceptualized and organized a **series of introductory lectures** and **research talks** by students and professors to introduce newcomers to key concepts in control theory such as PID control, Kalman filtering and their industrial applications
- Ideated and coordinated the **Summer Learning Projects-2020**, which provided a platform for **20+** students to work collaboratively on various fundamental topics of control theory, and their implementation on MATLAB for simple benchmark problems
- Managed and tailored content for the **CDS-SRG FB page** with a reach over 2500+ students

Institute Student Mentor

STUDENT MENTOR PROGRAM, IIT BOMBAY

Jul 2020 - Jun 2021

- One of the only **12** third-year undergraduate students selected via a rigorous procedure comprising of **SOP**, **peer reviews** and **interviews**, to mentor a group of incoming first-year undergraduate students amongst a batch of **1000+**
- Mentored a group of **14** students to provide the necessary support, academic and otherwise

Department Student Mentor

DEPARTMENT OF AEROSPACE ENGINEERING, IIT BOMBAY

Jul 2020 - Jun 2021

- Selected into a team of **19** mentors based on extensive peer reviews and interviews, to **monitor** the academic performance of **6** second-year undergraduate students and provide **academic guidance** and **counsel**
- Involved in bridging the student-faculty gap and enhancing the students' academic experience

Prevention of Sexual Harassment (PoSH) Member

GENDER CELL, IIT BOMBAY

Jun 2019 - Jul 2020

- Attended a **two-day** training workshop conducted by **PoSH at Work** on understanding *Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013* and creating awareness about it
- Conducted sessions on **gender sensitization**, and the institute's policy on sexual harassment and its redressal on behalf of the Gender Cell for **100+** first-year undergraduate students

Publications

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| Jan 2021 | Ranade, A.R., Prathiksh, K. , et al. " <i>Survey and Analysis of Payloads for Missions on PSLV's Orbital Platform.</i> " presented in the AIAA SciTech Forum 2021 , Nashville, TN |
| Dec 2020 | Katla V., Prathiksh, K. , et al. " <i>An Approach to Star Tracker Design for Nano-Satellite Application</i> " presented in National Conference on Small Satellite Technology and Applications 2020 , Trivandrum, India |

Achievements

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| 2016 | Recipient of National Talent Search Examination Scholarship (NTSE) given by NCERT, India |
| Aug 2018 | Secured First place in EnB Buzz - 2018 Competition out of 100+ teams for exceptional performance in presenting a fictitious business idea and a corresponding Business Model Canvas (BMC) |
| 2022 | Recipient of the Mitacs Globalink Research Internship , a competitive initiative for international undergraduates in Canada |

Extracurricular Activities

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| 2018 - 2019 | Conducted classes on interactive science experiments for underprivileged school students under NSS Prayog (Middle School) and NSS Asha initiative (High School) with NGO Asha |
| Jun 2020 | Authored an article titled " Biomimicry " which was featured in the Airspace magazine - India's first national student magazine on aerospace engineering by the students of IIT Bombay |
| Jan 2020 | Co-authored a white paper as a GGI Fellow 2021 titled " Internationalisation of Higher Education in India 2021 " |
- An avid reader; particularly enjoy genres such as science-fiction, dystopian & coming-of-age
An active squash player; passionately follow tennis, Formula 1 & Liverpool F.C.