PRAJWAL PRATHIKSH

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EDUCATION

Indian Institute of Technology, Bombay **Jul 2018 - Aug 2023**
Dual-Degree (Bachelor's + Master's) in Aerospace Engineering
GPA: 9.03/10

ACADEMIC ACHIEVEMENTS

- Ranked 3rd in the Department of Aerospace Engineering, IIT Bombay **(2023)**
- Awarded the Undergraduate Research Award-03 for exceptional work on Master's Thesis **(2023)**
- Recipient of National Talent Search Examination Scholarship (NTSE) given by NCERT, India **(2016)**

CONFERENCE PAPERS

- Mishra, K., **Prathiksh, K.**, et al. *"Autonomous Star Identification Algorithm for Tracking Mode of Star Tracker"*, (extended abstract) presented at IAA-ISRO SMOPS 2023 Conference, Bangalore, India
- Ranade, A.R., **Prathiksh, K.**, et al. *"Survey and Analysis of Payloads for Missions on PSLV's Orbital Platform."*, presented at the AIAA SciTech Forum 2021, Nashville, TN, USA (Online)
- Virul Katla, **Prathiksh, K.** et al. *"An Approach to Star Tracker Design for Nano-Satellite Applications"*, (extended abstract) presented at NCSSTA 2020, Thiruvananthapuram, India (Online)

RESEARCH EXPERIENCE

Turbulence Modelling for SPH **Jul 2022 - Jul 2023**
With Prof. Prabhu Ramachandran, Aerospace Engineering, IIT Bombay *Master's Thesis*

- Conducted an extensive review of 70+ research papers to classify & categorize turbulence models for Smoothed Particle Hydrodynamics (SPH) simulations and developed a robust evaluation framework focused on reproducibility, accuracy, convergence and computational efficiency in time-varying flows
- Implemented and compared 5 SPH turbulence models, along with an automated post-processing pipeline to analyze flow dynamics using Finite-Time Lyapunov Exponents (FTLE), Vorticity & Energy spectra
- Developed & deployed high-performance computing (HPC) code using in-house SPH solvers with `OpenMP` parallelization on IIT Bombay's HPC cluster and optimized the code for performance and scalability

Awarded *the Best Master's Thesis nationally at Symposium on CFD by Aeronautical Society of India*

Control of Micro-flagellated Robots **May 2022 - Jul 2022**
With Prof. Henry Shum, Applied Mathematics, University of Waterloo *Research Internship*

- Investigated forces on swimmer configurations in dynamic magnetic fields through parametric studies
- Decomposed propulsive forces acting on a bi-flagellated swimmer at low Reynolds numbers using Discrete Fourier Transform (DFT) to elucidate the origin of super-helical trajectories reported in the literature

Received *the Globalink Research Internship Award by MITACS with full funding for on-site research*

Study of self-propelled bodies in incompressible fluid **Jul 2021 - Apr 2022**
With Prof. Prabhu Ramachandran, Aerospace Engineering, IIT Bombay *Bachelor's Thesis*

- Simulated the vortex shedding of heaving swimmers in incompressible flow using vortex methods
- Analyzed correlations in lift, drag and thrust coefficients between simulations and theoretical models for different heaving amplitudes, frequencies and trajectories at equivalent Strouhal and Reynolds numbers
- Developed a real-time 2D flow viz. tool using `mayavi` to analyze vortex shedding in the swimmer's wake

Atmospheric-based Ionic Propulsion **Mar 2019 - Dec 2019**
With Prof. Kowsik Bodi, Aerospace Engineering, IIT Bombay *Student Project*

- Engineered a solid-state propulsion system using electrohydrodynamic thrust for atmospheric flight
- Designed and built a high-voltage circuit capable of converting 12V DC to 80-120 kV DC and an experimental setup at IIT Bombay Aerodynamics Lab to measure thrust with a resolution of 0.1 mN
- Simulated thrust generation in COMSOL Multiphysics and correlated results with experimental data

Accolades: *Best Project amongst 50+ teams; Presented working prototype at IITB Alumni Day 2019*

PROFESSIONAL EXPERIENCE

Data Scientist **Aug 2023 - Present**
Anheuser-Busch InBev, Bangalore, India (Finance Analytics)

- Overhauled payment leakages model coordinating with 5+ cross-functional teams to achieve 100% coverage, E2E automation and global scalability, resulting in an EBIDTA impact of USD $5M+ (2024)
- Enhanced accuracy and latency of unstructured data pipelines for invoices & statements ingestion using LLMs, achieving 98% accuracy with a 20s processing time, surpassing industry benchmarks by 30%
- Reduced runtime by 460% using `cython`, vectorization processing techniques and asynchronous data I/O
- Guided 5+ members in developing a full-stack, touchless payment reconciliation tool with email correspondence capabilities & summarized insights by leveraging NLP & LLMs for 60% faster clearing time

Accolades: *Rockstar Rookie (2024) (2 out of 30+ fresh hires); Excellence & Innovation - Team Award (2024); Pint - Individual Award (2023); Sole fresh hire entrusted with recruiting junior data scientists*

Data Scientist Intern **May 2021 - Jul 2021**
Anheuser-Busch InBev, Bangalore, India (Supply & Logistics Analytics)

- Tackled high logistics costs by developing an optimization algorithm for delivery load linking under geographical and business constraints, reducing VLC costs by 10% and trucks on the road by 8%

KEY TECHNICAL PROJECTS

IIT Bombay Student Satellite Program **Feb 2019 - Oct 2021**
Controls, Payload, GNC Engineer and System Head *Student Project*

- Surveyed and analyzed the feasibility of payloads for experimentation on-board Stage 4 of ISRO's PSLV
- Designed and implemented a novel star-matching algorithm featuring multiple modes to optimize the trade-off between accuracy & latency during the start-up, tracking & reacquisition phases of a star tracker
- Spearheaded and contributed to the development of the Open-Loop Simulation framework, to serve as the testbed for the software, hardware and payload integration of the star tracker in a cube-satellite
- Led a team of 25 students in building the star tracker, taking technical, strategic and administrative decisions while ensuring compliance with QA practices and knowledge transfers as the System Head

Numerical Study of SPH Integrators for Incompressible Flow **Dec 2020 - Apr 2021**
With Prof. Prabhu Ramachandran, Aerospace Engineering, IIT Bombay *Research Project*

- Implemented 14 time-integration schemes (Linear, Symplectic, RK & PEC) for incompressible SPH equations to evaluate their stability, accuracy & computational efficiency as an original study in the field
- Automated testing and processing of 500+ simulations for the Harmonic oscillator, Lenard-Jones oscillator and Taylor-Green vortex simulations for various scheme orders, CFL and particle numbers

Path Optimization for Combinatorial Problems **Spring 2021**
With Prof. Abhijit Gogulapati, Aerospace Engineering, IIT Bombay *Course Project*

- Implemented and compared the performance of Genetic, Ant Colony, Simulated Annealing and Branch-and-Bound algorithms for combinatorial optimization of mixed-integer programming problems
- Optimized runtime of algos. using `numba` & automated model testing on 20+ std. test cases via `automan`

POSITIONS OF RESPONSIBILITY

Teaching Assistantships

Graduate Courses

AE 6102: Parallel Scientific Computing and Visualization **Spring 2023**

· Supported the professor in student mentoring, conducting tutorials, evaluating course projects & exams
· Assisted in developing automated plagiarism checks and grading scripts for assignments and exams

Undergraduate Courses

AE 225: Incompressible Fluid Mechanics **Autumn 2022**

· Course taken by 70+ students; tasked with student query resolution & grading of assignments & exams

BB 101: Introduction to Biology **Autumn 2019**

· Course taken by 1000+ students; responsibilities included grading, mentoring and conducting tutorials

Mentorship

Institute Student Mentor **Jul 2020 - Jul 2021**

· Part of a 100+ member undergraduate student body responsible for mentoring 1000+ first-year students, providing guidance and academic support and fostering a sense of community at IIT Bombay
One of 12 third-year students selected through a rigorous interview, peer review and SOP process

Department Academic Mentor **Jul 2020 - Jul 2021**

· Part of a 19-member team of academic mentors for Dept. of Aerospace Engg., responsible for monitoring the academic progress of 6 sophomores and bridging the gap between students, faculty and administration

Manager, Controls & Dynamical Systems Student Reading Group Mar 2020 - Mar 2021

· Organized lectures in control theory & dynamical systems by faculty and SMEs engaging 200+ students
· Led the Summer Learning Projects 2020, successfully coordinating a 3-month online research initiative for 20+ students to tackle problems in control theory collaboratively and preparing academic reports

RELEVANT COURSES & SKILLS

· **Math:** Calculus, Linear Algebra, Differential Equations, Numerical Analysis, Continuum Mechanics, Optimization for Engineering Design, Signals and Systems, Hydrodynamic Stability Theory
· **Computing:** Parallel Scientific Computing and Visualization, Computing of Turbulent Flows, Computer Programming and Utilization, Data Analysis and Interpretation
· **Programming:** Python, C++, MATLAB, SQL, Rust, PowerShell, Bash
· **Tools:** Simulink, OpenMP, Numba, COMSOL Multiphysics, Git, GNU coreutils, Neovim, LaTeX

STANDARDIZED TESTS

· **GRE:** 332/340 *(Quantitative: 169, Verbal: 163, Analytical Writing: 4.5)*
· **TOEFL:** 115/120 *(Reading: 29, Listening: 29, Speaking: 28, Writing: 29)*

EXTRACURRICULAR ACTIVITIES

· Co-authored a white paper titled *"Internationalisation of Higher Education in India 2021"* **(2021)**
· Authored an article titled *"Biomimicry"* - featured in Airspace magazine **(2020)**
· Presented a talk on *"Introduction to Nanosatellite Control"* to students at IIT Bombay **(2020)**
· Conducted classes on interactive science experiments for underprivileged school students under NSS Prayog (Middle School) and NSS Asha initiatives (High School) with NGO Asha **(2018-19)**
· Secured 1st out of 100+ teams in EnB Buzz Competition, organized by EnB Club, IIT Bombay **(2018)**
An avid reader of science fiction, philosophy and history books; enjoy playing squash and badminton