Amal S Sebastian
Aerospace Engineering
Indian Institute of Technology Bombay

170010054
UG Third Year (B.Tech.)
Male
DOB: 18/02/1999

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2020	8.83
Intermediate/+2	CBSE	Maharishi Vidya Mandir Sr. Sec. School	2017	96.00
Matriculation	CBSE	Kendriya Vidyalaya, Gill Nagar	2015	10.00

Pursuing a **Minor** in **Computer Science and Engineering**

Scholastic Achievements

- Recieved **AP** grade for exceptional performance in Vibrations and Structural Dyanimcs course. *(2019)*
- Inducted as a student member of the **Indian National Academy of Engineers** *(2019)*
- Secured **All India Rank 1572** in **JEE Advanced 2017** among **200,000** students. *(2017)*
- Achieved **All India Rank 834** in the **JEE Mains 2017** taken by over **1.2 million** students. *(2017)*
- Among the **top 1 percent** in the state in **National Standard Examination in Chemistry.** *(2016)*
- Among the 500 students who qualified for the **Indian National Astronomy Olympiad** by clearing the National Standard Examination in Astronomy (NSEA). *(2016)*
- Recipient of the prestigious **NTSE** scholarship given by NCERT to **1000** students every year. *(2015)*
- Secured **All India Rank 24** and Regional Rank 1 (Chennai Region) in KVS **Junior Maths Olympiad** among 10,000 students. *(2014)*
- Recipient of the **INSPIRE** award given by the Ministry of Science and Technology. *(2014)*

Key Projects

PySPH and Mayavi

Guide: Prof. Prabhu Ramachandran, Dept. of Aerospace Engineering *(Jan '19 - Present)*

- Developed code to generate **uniform particle** distribution and **surface particle** distribution of a STL object which can used for **SPH simulations** in **PySPH** an open source framework for Smoothed Particle Hydrodynamics(**SPH**) simulations.
- Currently working on simulating a head on collision of vortex rings using SPH.
- Developed code to visualize **STL objects** along with their **normals** and allow for **inversion** of the normals using mouse interaction for **Mayavi** a **3D scientific data visualization** and plotting package built on Visualisation Toolkit **(VTK)** using **Python**.
- Modified the Picker structure to display coordinate and data information on the scene using VTK's Text widget. Implemented an on scene slider and button widget for Mayavi.

Trajectory Modelling of Long March 3B/Bediou 3M-15 *(Apr '19)*

Guide: Prof. Ashok Joshi, Dept. of Aerospace Engineering *Course project*

- Designed the complete **ascent mission** trajectory of the four stages of **Long March 3B**, writing comprehensive code in **Python** to find burn profile and the gravity turn at each stage.
- Found out the optimal **orbital manoeuvres** taken by **Bediou 3M-15** to reach final orbit from point of release in actual mission time and made an simulation of the same using **Mayavi**.

Computation using potential flow theory *(Nov '18)*

Guide: Prof. Aniruddha Sinha, Dept. of Aerospace Engineering *Course project*

- Used the concept of stream function to obtain and visualize the streamlines for **super-critical circulation** of a **rotating cylinder** in **Python** by superimposing results of doublet,vortex and uniform flow.
- Analysed and presented the effects of changes in parameters to the distribution of streamlines.

Team Member,Aerodynamics Subdivision, RAKSHAK

Institute Technical Team *(Sep '18 - Present)*

- Part of the aerodynamics subdivision of the team, which designs and creates **autonomous aircrafts**.
- Analyzed hundreds of airfoils in search of optimal airfoil for our need on **XFLR5**.
- Designed wing structure and wing ribs on **SOLIDWORKS** and **AutoCAD** respectively.
- Conducted **CFD** analysis on **Ansys Fluent** to estimating performance characteristics.
- Represented RAKSHAK at the **Indian National Academy of Engineering's Youth Conclave** at IIT Delhi under the Lab to Market category and secured **first** place in it.

Solving Laplace equation using PETSc
Guide: Prof.Kowsik Bodi, Dept. of Aerospace Engineering *(Jun '18 - Jul '18)*

- Studied and implemented code in **Python** for **LU decomposition**, **Jacobi** iterative scheme, **Gauss-Siedel** iterative scheme, **Euler method** and **Runge-Kutta** method.
- Successfully wrote code using **PETSc** to solve Laplace equation for a **N X N grid** for given boundary conditions and obtained **contour plots** for the same.

Cyclocopter
Institute Technical Summer Project *(Jun '18 - Jul '18)*

- Aim of the project was to create a **VTOL** device based on **cycloidal blade systems**.
- **Designed** various components for the cyclocopter after **extensive analysis and evaluation** of various attempts made by researchers across the globe.
- **Successfully built** the framework from scratch and **conducted positive tests** of major components.

Data Analysis *(Apr '18)*
Guide: Prof. Prabhu Ramchandran, Dept. of Aerospace Engineering *Course project*

- Analyzed how **education affects various parameters of society** on the basis of the **2001 district-wise Indian Census report** using **pandas** library.
- **Correlated the data** of literacy rate to various parameters such as sex ratio, number of educational institutions, graduates, workers etc.

Chain Reaction *(Apr '18)*
Guide: Prof. Krishna S, Dept. of Computer Science and Engineering *Course project*

- Aim of the project was to **develop a program** using **C++** which would allow two users to play the classic chain reaction game in a 9X6 grid.
- Used various fundamental concepts such a **nested loops and structures** in the design of the code.

Technical Skills

- *Programming Languages:* C, C++, Python, Cython, LaTeX
- *Software Tools:* XFLR5, Ansys Fluent, SOLIDWORKS, AutoCAD, Git
- *Python Packages:* NumPy, Matplotlib, pandas, Mayavi, PySPH, VTK, Numba, Traits

Positions of Responsibility

Department Academic Mentor (DAMP) *(May '19 - Present)*
Dept. of Aerospace Engineering

- Responsible for looking after the academic and non-academic welfare of five second year students of the department.
- Helped in organising a session to educate around 60 first year students about the minor and honor programmes offered by the institute.

Courses Undertaken

Aerospace	Incompressible Fluid Mechanics, Compressible Fluid Mechanics, Computational Fluid Dynamics*, Particle Methods for Fluid Flow Simulations*, Hypersonic Flow Theory, Aerodynamics, Control Theory, Spaceflight Mechanics, Vibration and Structural Mechanics, Aerospace Propulsion, Aircraft Propulsion
Computer Science and Maths	Introduction to Machine Learning*, Data Structures and Algorithms, Computer Programming and Utilization, Logic for Computer Science, Introduction to Numerical Analysis, Calculus, Linear Algebra, Differential Equations, Data Analysis and Interpretation

** to be completed by April 2020*

Extra-Curricular Activities

- Trained for one year in **Table Tennis** under **National Sports Organisation**. *(Jul '17 - Apr '18)*
- Represented hostel in the **Table Tennis General Championship**, also secured **second position** in the intra hostel table tennis tournament. *(Aug '18)*
- One among **100 students** selected by **NCERT** to participate in the **National Youth Festival** conducted at NCERT, New Delhi on the basis of a creative writing competition as part of AEP. *(Jan '15)*
- Actively participated in the **Scouting Movement** having achieved the **Tritiya Sopan** Badge. *('12-'15)*
- Selected to participate in **German language** camp conducted by **Goethe-Institut**, Chennai. *(Oct '12)*