Stuti Singla | **22B0046**
Aerospace Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Female**
DOB: 05/11/2003

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	
Intermediate	CBSE	Modern Vidya Niketan	2022	96.80%
Matriculation	CBSE	St. John's School	2020	97.80%

Scholastic Achievements

- Honoured with **Merit Certificate** for being in top **0.1** percent among 3.5 million in Class-X CBSE Boards *('20)*
- Accorded with the **Scholar's Award** for **6** consecutive years for the best **all-round** performance in School *(2015-20)*
- Awarded with a **100%** Scholarship for **2** consecutive academic years by MVN School among 300+ students *(2021-22)*

International Exposure

Spaceport America Cup 2024 | New Mexico, USA | Rocket team, IITB *(Jun '24)*

World's largest Intercollegiate Rocket Engineering Competition for student rocketry teams | Teams: 150+

- Earned **2nd** national, **19th** in **10K ft** commercial motor category worldwide and **35th** overall among **150+** teams
- Co-authored a **70**-page **project technical report** containing a detailed and thorough analysis of the project's work
- Engaged with **6000+** global rocketeers at an international conference hosted by **ESRA** enhancing industry knowledge

Professional Experience

Research Analyst | Stoolix Technologies *(Jul '24)*

Stoolix pioneers digital transformation through innovative website design and strategic digital marketing solutions

- Analyzed **25+** market reports to conduct comprehensive research and identified key trends within the **F&B** sector
- Improved the decision-making accuracy by **15%** by producing **7** detailed reports, providing insights for management
- Boosted customer satisfaction by **20%** through analysis of consumer behavior from a dataset of **10,000+** respondents

Key Projects

Image Colourisation using GANs | Winter in Data Science | ITC *(Dec '23 - Jan '24)*

- Implemented generator and discriminator networks using **Leaky-ReLU** with a slope of **0.2** and **Adam** optimizer
- Utilized the publicly available **CIFAR-10** and **Places365** datasets to train the advanced generative neural network
- Achieved a test accuracy of **65.5%**, outperforming another popular convolutional neural network **U-Net** by **28.8%**

Image Restoration | Course Project | Machine Learning for Remote Sensing *(Jan '24 - May '24)*

- Developed **Deblurring** Model, integrating encoder-decoder architecture with skip connections for spatial retention
- Utilized Python libraries such as **os**, **OpenCV**, **SciPy**, and **PIL** to construct a robust pipeline to blur sharp images
- Optimized model performance, achieving a significant improvement in accuracy from **9.46%** to **76%** over **50** epochs

Machine Learning | Learner's Space | Web and coding club, IITB *(Jun '24 - Present)*

- Retrained **YOLOv8** for car part detection, achieving a recall score of **76.5%** & F1-score of **74%**, improving accuracy
- Enhanced overall model performance attaining an overall recall confidence score of **82%** and precision-score of **99%**
- Achieved an optimal detection accuracy for car parts by adjusting the learning rate and epochs for images of **640px**

Aircraft Incidents Analysis | Course Project | AI and Data Science *(Jan '24-May '24)*

- Analyzed **23,000+** aviation incidents spanning from 1919 to 2020, employing advanced data visualization techniques to uncover trends such as peak incident years during World War II, and validating with the historic data available
- Identified **correlation** factors like number of occupants and fatalities, highlighting insights into aviation safety risks
- Conducted **hypothesis-testing** & found significant relationship between aircraft operational phase & damage type
- Performed **regression analysis**, revealing a strong correlation between aircraft age and the occupant fatality ratio

Bird Species Recognition with CNN | Self Project *(Feb '24-Mar '24)*

- Analyzed & preprocessed the **CUB** dataset containing **11,700+** bird images, categorized into **200+** distinct classes
- Attempted to develop a custom CNN model, drawing inspiration from the architecture of **VGG-16** for a given task
- Implemented various pre-trained models like **EfficientNet** and **InceptionNet** and verified their relative performance
- Improved the performance of the final model by **50%**, employing methods like **dropout**, and **data augmentation**

Bag of Visual Words Model | Self Project *(Oct '23-Nov '23)*

- Implemented the Bag of Visual Words model for image classification, emphasizing feature extraction via clustering
- Conducted experiments by varying **K** in K-means clustering and analyzed the impact made on classification accuracy
- Enhanced feature representation to **K+20** by incorporating comprehensive **Gray Level Co-occurrence Matrix** (5 directions, 4 parameters each) into the BoVW framework and applied L2 normalization on concatenated features

Back Propagation Model | Self Project *(Sep '23-Oct '23)*

- Developed a **two-layer** neural network in PyTorch for regression tasks, incorporating **ReLU** activation to introduce a non linearity into the network and training with **MSE** loss and **SGD** optimizer to minimize the prediction errors
- Implemented forward and backward passes to compute predictions, calculate loss, and update the model parameters

Technical Experience

Project Agastya | Airframe Subsystem | Rocket team, IITB *(Jul '23 - Jun '24)*

*Agastya embodies the culmination of the IITB Rocket team's year-long dedication to achieving excellence in the SA Cup It reached a height of **9,200 ft**, within **10%** of predicted apogee, hitting **Mach 0.74** and surviving max **10G** acceleration*

- Build and tested a **reusable rocket** with passive stabilization to evaluate the motor, avionics, and ejection system
- Aided the development of a **Reefed** parachute recovery system, employing tube-like shock cords to prevent tangling
- Developed a prototype that can actively **increase** the **drag** of the rocket to achieve the **precise target altitudes**

Positions of Responsibility

Subsystem Head | Airframe and Recovery Subsystem | IIT Bombay Rocket Team *(Aug '24 - Present)*

*An interdisciplinary team of **40+** students developing high powered rockets under the guidance of IIT Bombay Professors*

- Leading a **3-tier 12-member** subsystem, overseeing aerodynamics, structural integrity, safety, & recovery of rocket
- Managing a budget of **15 Lakhs** in collaboration with fellow heads & leads, ensuring an optimal resource allocation
- Ensuring adherence to project timelines and budget constraints, effectively coordinating team efforts for the projects
- Fostering a positive team atmosphere, promoting open communication and constructive feedback amongst the team

Hostel Technical councillor | Hostel Affairs Council, IIT Bombay *(Apr '24 - present)*

- Serving as a **hostel representative** in the Technical Committee, coordinating all the tech activities in the campus
- Introducing **0.5M** INR worth of tech equipment and softwares including computers to enhance the technical culture
- Leading team formation & overseeing logistics for student involvement in the Inter-Hostel Tech General Championship

Hostel Maintenance Secretary | Hostel Affairs Council, IIT Bombay *(Aug '23 - Jul '24)*

- Part of a **6** membered hostel maintenance council addressing maintenance related concerns of over **1000+** residents
- Organized **Pandora**, the annual hostel fest recieving a footfall of over **5K+** residents including students and faculty
- Ensured quick resolution of over **2K+** maintenance-related queries by coordinating with various authorities & offices

Technical Skills

Languages	Python (Pytorch, Tensorflow, OpenCV, numpy, matplotlib, scikit-learn, PIL), C++/C, SQL, LaTeX, HTML
Software	MATLAB, Solidworks, Fusion 360, MS-Office, AutoCAD, Ansys (Mechanical, Fluent), OpenRocket, OpenVSP

Extracurricular Activities

Cultural	• **Gold Medalist** under stage play at the **Inter IIT Cultural Meet 6.0** held at **IIT Kharagpur** • Secured **1st place** and a prize of **INR 25,000** in stage play at **Thirdbell-Mood Indigo 2023** • Part of a **300+** member team to pull off the best **PAF** of all time, winning **12/12** genre awards
Sports	• Completed over **40** hours of rigorous training spanned over a year under **NCC , IIT Bombay** • Participated and contributed in winning the **first** position in Inter-House Relay race competition
Social	• Raised funds and Spread Awareness for cancer sufferers and the elderly people irrespective of caste, creed or culture as a part of **Global Cancer Concern India** and **Help Age India's** Program • Certified **Fortis Pro-Social Peer Moderator** for aggression management by Fortis healthcare
Miscellaneous	• Visited **Indian Navy Ship Shikra** facility as a part of a **departmental Industrial visit** and had hands-on experience with all the advanced and upcoming facilities available at the naval base • Secured **2nd best interjector** title at the **Dr. Paulos Mar Gregorious Memorial** Inter-School Debate competition, contributing to winning **Best Team** position for the **third** consecutive time