Sabyasachi Samantaray | **210050138**
Computer Science & Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 07/06/2003

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2025	
Intermediate	TSBIE	Sri Chaitanya Jr Kalasala	2021	98.80%
Matriculation	BSET	Sri Chaitanya High School	2019	10

Pursuing a **Minor** in **Centre for Machine Intelligence and Data Science**

Scholastic Achievements

- Ranked **15th** out of 194 students in **Computer Science Department** based on academic performance *('23)*
- Secured an **All India Rank 163** in **Joint Entrance Examination, Mains** out of **11 lakh candidates** *('21)*
- Secured an **All India Rank 270** in **Joint Entrance Examination, Advanced** among **2.5 lakh candidates** *('21)*
- Secured **State Rank 60** in **TS EAMCET** among **2 lakh+ candidates** conducted by **TSCHE**, Hyderabad *('21)*
- Secured an **All India Rank 77** in **VITEEE**, conducted by **Vellore Institute of Technology**(VIT) *('21)*
- Among the **top 50+ students** qualified for **OCSC**, Orientation cum Selection Camp having placed for **INPHO** *('21)*
- Qualified **NSEC** and **NSEP** having placed in the **National Top 1%** out of **17K+ registered candidates** *('21)*
- **Recipient** of **KVPY**(SX) **Fellowship** organized by **IISC, Bangalore** for securing **All India Rank 587** *('20)*
- Secured **Rank 6** in **STSE, Level II** conducted by ASRAC, **Dr. A.S. Rao Awards Council** across AP&TS *('17)*
- Secured **Zonal Rank 24** in NCO (**National Cyber Olympiad**) conducted by Science Olympiad Foundation *('15)*

Research Experience

Breast Cancer Diagnosis *(Summer '23)*

Prof. Thomas Deserno | Research Intern, Technische Universität Braunschweig

- Served as the **project lead**, explored diagnostic potential of **Angular Thermal Breast Infrared Images**, using Radiomic and Texture based feature descriptors and also **Transfer Learning** from pretrained CNN architectures
- Contributed to **data cleaning of DMR IR** Thermal IR dataset, reported **anomalies** to database mastology center
- Enhanced **U-Net based segmentation** using data augmentation and mask smoothing techniques, utilised **BM3D denoising** and **CLAHE contrast enhancement** techniques to improve the **Computer Aided Diagnosis** tools
- Explored the **diagnostic capability** of **asymmetry analysis** on the breast segments of Frontal IR images

Guided Optimal Extrication *(Summer '23)*

Prof. Thomas Deserno | Research Intern, Technische Universität Braunschweig

- Developed a framework to aid in the **automated efficient extrication** of entrapped victims of **Motor Vehicular Accidents**, contributing to the advancement of **3D Digital Rescue Sheet** system using BlenderPy and BeamNG.Tech
- Developed algorithms for **surface detection** and **modelled cost function** for voxelized 3D deformed car meshes
- Explored various traditional **cutting algorithms** and modelled the problem as a **watershed segmentation**

Metabolic Health Risk Analysis *(Spring '23)*

Prof. K V Venkatesh | Institute Student Undergraduate Research Project

- Assisted in **Coding the interface** to analyze **risk and lifestyle scores** for various metabolic disorders using blood reports, generated plots depicting distributions of **disease risk** for individuals in healthy and sick categories
- Employed **Sequential Linear Regression** on KEM Diabetic dataset to predict **postprandial glucose values**
- Achieved impressive results with **3.29% average percentage error** in predicting area under the glucose-time curve

Key Projects

Deep RL for Finance | *FinSearch, Finance Club* *(Ongoing)*

- Researching applications of **Reinforcement Learning** (RL) in stock trading to **optimise investment returns**
- Exploring **traditional and Deep RL** based methods to address **learning instability** and **high variance** issues
- Successfully Implemented **Q-learning Temporal Difference strategy** to maximise 10 years returns on **NIFTY50**

Drug Discovery | *Summer of Science, Mathematics and Physics Club* *(Ongoing)*

- Developing an **interactive protein analysis tool** to study and visualise protein druggability using **AlphaFold2.0**
- Employing Advanced **Text mining** techniques to uncover **drug-target associations** from **scientific literature**
- Enriching the **Brain Disease Drug Finder** (BDDF) platform, contributing to advancement of **BrainProtv4.0**

Image Captioning using Deep Learning | *Winter in Data Science, Analytics Club* *(Winter '22)*

- Developed a rudimentary **Encoder-Decoder** Architecture for Image Caption Generation using the Flickr8k dataset
- Employed **NLP techniques** and GloVe word-embeddings to effectively preprocess captions for enhanced performance
- Utilized pretrained **VGG16**-based CNN feature extraction and **LSTM** for caption processing in the encoder stage
- **Improved caption quality** using **Beam Search** during prediction, as evidenced by **corpus BLEU scores**

Academic Projects

Image Segmentation *(Spring '23)*
Prof. Suyash Awate | Course Project, Medical Image Computing

- Studied, Implemented and Evaluated the **Hybrid Ant Colony Optimisation - K Means** Algorithm for precise Medical Image Segmentation, **outperformed traditional K-Means** for both noisy and low contrast images
- **Modified** the proposed **normalised multi-objective** optimization by allowing for minor momentary falls
- **Tuned hyper parameters** customized according to the specific characteristics of **diverse organ images**

PCA based Image Reconstruction *(Autumn '22)*
Prof. Suyash Awate | Course Project, Data Analysis and Interpretation

- Utilized PCA to analyse image datasets and for their **Dimensionality Reduction** into lower dimensional hyperspace
- Maximised the total dispersion with respect to the chosen hyperplane to **generate new, representative images**
- **Reconstructed images** using **Eigen Vector Analysis** and utilized Frobenius Norm to measure closeness

Data Prefetching IPCP2.0 *(Spring '23)*
Prof. Biswabandan Panda | Course Project, Computer Architecture

- Conducted a **comprehensive evaluation** of the IPCP (**Instruction Pointer Classifier Based Prefetcher**) on various traces and identified areas of improvement specific to different classes of **Instruction Pointers**
- **Integrated** all the proposed enhancements to develop a more **advanced** and **efficient version** of the prefetcher
- Demonstrated notable **improvements in IPC values**, with **3.31%** on **Graph traces**, **1.05%** on **SPEC traces**

Cinema A to Z *(Autumn '22)*
Prof. Kavi Arya | Course Project, Software Systems

- **Deployed** a comprehensive web application using **Django**, providing a **centralized platform** for movie information
- Utilized **Selenium web scraping** for movie related data, effectively handling **Javascript rendered web pages**
- Ideated (M2VE)**Movie-to-Vector-Encoder** using LSTM-based multi-genre classification model and NLP embeddings, leveraged Movie-Vector Embeddings with **K-nearest neighbors** algorithm and cosine similarity for related movies

SimpleFTP *(Spring '23)*
Prof. Bhaskaran Raman | Course Project, Computer Networks

- Developed a **client-server program** for **file transfer** after **TCP connection** establishment via Tomlinson handshake
- Extended functionality for **simultaneous multiple client support**, using **select system call** appropriately

Sliding Puzzle Solver *(Spring '23)*
Prof. Ashutosh Gupta | Course Project, Logic for Computer Science

- Designed a solver for the **sliding puzzle game** using a **SAT problem encoding** in a python script using **Z3Py**

Board of Conquest *(Spring '22)*
Prof. Rushikesh K. Joshi | Course Project, Abstractions and Paradigms of Programming

- **Ideated and Developed** an interactive **PvP**(two player) **board game** in **C++** using **FLTK library** for the **GUI**
- Leveraged principles of **Object-Oriented Programming** and implemented **smoothly functioning** timely updates

Railway Planner *(Autumn '22)*
Prof. Supratik Chakraborty | Course Project, Data Structures and Algorithms

- Developed a comprehensive **Journey Planner** for the **Railway Management System**, integrating and implementing functionalities of diverse **Data Structures** for seamless management and swift retrieval of journey information

Courses Undertaken

Computer Science	Abstractions & Paradigms, Data Structures & Algorithms, Data Analysis & Interpretation, Software Systems, Computer Networks, Algorithm Design & Analysis, Logic for Computer Science, Medical Image Computing, Operating Systems*, AI & ML*, Automata Theory*
Mathematics	Calculus, Linear Algebra, ODE, Discrete Structures, Mathematical Structures for Control

*To be completed by April '24

Technical Skills

Languages and Tools	C++, Python, MATLAB, Java, VHDL, NS3, Wireshark, GDB, LaTeX, GitHub, Bash
Development	HTML, Bootstrap, Django, Sqlite3, PHP, FLTK, React, Selenium, Doxygen, Sphinx
ML & Data Science	MatPlotlib, OpenCV, Tensorflow, Scikit, PyTorch, NLTK, ARIMA, GloVe, Spacy

Extracurricular Achievements

- Member of the **Conference organising team** for **Monsoon Advanced Proteomic School, 2023**, IIT Bombay
- Attended the prestigious **BVM Conference 2023** in **Germany** organised by PLRI for Medical Informatics
- Achieved first place in the **CoDecode** coding Hackathon, hosted by **Techfest, 2022**, as a dynamic team of two
- Won the **Intra SSD Debate Tournament '22** out of 12 competing teams at National Service Scheme, IIT Bombay
- Earned the title of **State Champion** in SIP Abacus'15 competition in **TS&AP** and **Runner-Up** in the **Nationals**