Sibasis Nayak
Computer Science & Engineering
Indian Institute of Technology Bombay

190050115
B.Tech.
Gender: Male
DOB: 07-06-2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	9.7
Intermediate	CBSE	SAI International School	2019	94.20%
Matriculation	CBSE	D.A.V. Public School, Pokhariput	2017	10

Pursuing **Honors in Computer Science and Engineering** and Minor in **Data Science and AI**

Scholastic Achievements

- Secured **All India Rank 58** in *IIT-JEE Advanced* amongst 2,40,000 candidates *(2019)*
- Secured **All India Rank 11** in *KVPY* and received the prestigious fellowship from Government of India *(2017)*
- Secured **All India Rank 234** in *IIT-JEE Main* out of 1.2 million candidates *(2019)*
- Awarded **prodigious award** for Academic Excellence by **M. Venkaiah Naidu, Hon'ble Vice President** *(2019)*
- Awarded National Talent Search Examination **NTSE** scholarship by NCERT, Government of India *(2017)*

Olympiads

- **INChO Scholar**: Recieved **Gold** medal for being among **top 42** students at OCSC for **IChO** *(2019)*
- **INPhO Scholar**: Selected among **top 35** students and invited to attend OCSC for **IPhO** *(2019)*
- **INAO Scholar** : Selected among **top 35** students and invited to attend OCSC for **IAO** *(2019)*
- Ranked among India's **top 300** (National Top **1%**) students selected for **INJSO** (Junior Science) by IAPT *[2015]*

Internships

Analysis of Movements *Summer 2021*
Guide: Prof. Thomas M. Deserno — Research Internship *TU Braunschweig, Germany*

- Examining causes of **artifacts in ECG** by detecting movements of the patient from multi-view video feeds
- Reviewed implementations of human pose estimation techniques to select **Openpose** as baseline model
- Implemented **SVD triangulation** to shift 2D poses from multiple views to single pose in 3D world coordinates
- Used **Lucas-Kanade optical-flow** to track keypoints and **designed** a search based algorithm to classify movements

Anomaly Segmentation *July 2021 - Present*
Machine Learning Internship *Shunya OS*

- Working on a modulated approach to implement **instance segmentation** particularly focussing on small objects
- Examining literature to choose the baseline architecture combination to implement using **TensorFlow** APIs

Key Projects

Difference based Image Noise Modelling *Spring 2021*
Guide: Prof. Ajit Rajwade | Course Project *IIT Bombay*

- Modelled intensity differences for an image sequence in temporal and spatial domains using the **Skellam distribution**
- Modified proposed model to a mode-based toleration for **background subtraction** in temporal domain to obtain a variance of **0.0327** from ground truth at optimal modal range on **UCSD** background subtraction dataset
- Used intensity difference in spatial domain for **edge detection** and obtained results comparable to Canny detection

OCDE Coding Platform *Autumn 2020*
Guide: Prof. Amitabha Sanyal | Course Project *IIT Bombay*

- Created a **web platform** providing an **IDE** for C++, Python, Ruby and support for user organised coding competitions
- Implemented user directory separation and and **sandbox** environment using **Docker** containers for data protection
- Used **Angular** and **Django** to create an interactive user-interface and implement secure user-authentication

Convolutional Neural Networks - Applications *Summer 2021*
Seasons of Code *WnCC, IIT Bombay*

- Led a team of **12** developers in implementing some practical applications of Convolutional Neural Networks
- Built a CNN model to predict diagnosis with **Covid-19/Pneumonia** from lung X-rays with $>$ **95%** accuracy
- Implemented multi-label classification using **ResNet** backbone to predict movie genres from posters from MovieLens

Textify - Text to LaTeX *Summer 2020*
Institute Technical Summer Project *Institute Technical Council*

- Developed a service using **OpenCV** to recognize handwritten text and convert it into digitised LaTeX script
- Implemented **Sobel filtering** to detect text regions and **A-star algorithm** to separate individual text lines
- Trained bidirectional **LSTM/GRU** based recurrent network to output text, with upwards of **90%** word accuracy

Transport Layer simulation *Spring 2021*
Guide: Prof. Vinay Ribeiro | Course Project *IIT Bombay*

- Implemented client and server using **Socket Programming in C**, to send files using different variants of **TCP**
- Used **Bash** to automate experiments and generate plots for comparing throughput, delay and packet loss
- Recorded network traffic using **Wireshark** and analysed window scaling graphs for TCP Cubic and Reno

Reconstruction of Brain MRIs *Spring 2021*
Guide: Prof. Ajit Rajwade | Course Project *IIT Bombay*

- Reconstructed complete slices from simulated measurments of brain MR volume slices at **18** random angles
- Used **inverse radon** transformation in MATLAB using **Ram-Lak** filter for reconstruction of a single MRI slice
- Performed **coupled-CS** based reconstruction by solving a regularized least squares problem with a **custom objective**

Other Projects

Hitomi Compressed Sensing *Course Project*

- Adapted publication from ICCV'11 to reconstruct spatial and temporal domain of the video from coded snapshot with the help of Orthogonal Matching Pursuit algorithm for sparse reconstruction to achieve RMSE of **0.0301**

Efficient 2D Structures *Course Project*

- Implemented a class for the Quad Tree data structure in C++ with the aim of efficiently representing **2D structures**, specially images, along with support for standard image processing functions like resizing and extraction

Robust mastermind Player *Course Project*

- Encoded moves of the mastermind into an **SAT** problem and solved using **z3py solver** robust to opponent's lies

RISC 16 Bit Processor *Course Project*

- Devised an efficient 22 state finite state machine for a rich instruction set based on 16 bit instructions, 8 registers and 4MB of RAM and synthesized the processor components in **Quartus Prime** using **VHDL**

Technical Skills

Programming	Proficient in C++, Python | Familiar with Bash, JS, Django, Typescript, MATLAB, VHDL
Softwares	Used Docker, AutoCad, Git, LaTeX, Flutter, Doxygen, Qiskit, Wireshark, Solidworks, Quartus
Data Science	Familiar with NumPy, Matplotlib, Pandas, TensorFlow, Keras, OpenCV, Selenium

Positions of Responsibility

Department Academic Mentor | *Department of CSE, IIT Bombay* *May 2021 - Present*

- Among the **26** candidates selected after extensive peer reviews and interviews out of **70+** applications
- Appointed the mentor and contact point of **8** sophomore students to resolve their academic queries

Teaching Assistant | *IIT Bombay* *Autumn 2020 & Spring 2021*

- PH107 - Quantum Physics | Autumn 2020 | Prof. Tomy : Conducted **tutorials** for a batch of **40** students
- ME119 - Engineering Drawing | Spring 2021 | Prof. Anant : Conducted **labs** for a batch of **15** students

AdAI | *IDEAS, IIT Bombay* *March'21 - Ongoing*

- Part of a team pre-incubated at **IDEAS, IIT Bombay** in level 2 cohort *'21-22* & eligible for a grant upto INR 200K

Relevant Courses

- **Computer Science:** Data Structures and Algorithms, Computer Networks, Software Systems Lab, Logic For Computer Science, Cryptography and Network Security, Advanced Image Processing, AI and ML*, Operating Systems*, Foundations of Intelligent and Learning Agents*, Blockchains and Cryptocurrency*, Automata Theory**
- **Mathematics:** Optimisation Models, Linear Algebra, Data Analysis and Interpretation, Calculus, Discrete Structures
- **Others**: Quantum Physics and Applications, Electrical and Electronic Circuits, Economics, Psychology*

* : *To be completed by December 2021* ** : *To be completed by December 2021*

Extracurriculars

- Stood **first** in Prospect-100 Global Hackathon, judged live by **Steve Wozniak**, co-founder of Apple *(2020)*
- Completed a one year training under **National Sports Organisation** (NSO Kho-Kho) *(2019-20)*
- Served as a mentor in **CovEd India** - an organisation to mentor students during the Covid-19 pandemic *(2020)*
- Recognised in multiple **Model United Nations(MUNs)** and served Secretary General in a MUN *(2014-17)*