Pradipta Parag Bora
Computer Science & Engineering
Indian Institute of Technology Bombay

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B.Tech.
Gender: Male
DOB: 20-12-2000

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	9.96
Intermediate	CBSE	Delhi Public School, Guwahati	2019	97.20%
Matriculation	CBSE	Delhi Public School, Guwahati	2017	10

Pursuing **Honors** in Computer Science and Engineering and **Minor** in **Machine Intelligence and Data Science**

Scholastic Achievements

- **Department Rank 3** in a batch of 145 Students. *(2021)*
- Awarded **9 AP** (Advanced Performer) grades for exceptional performance in courses including Data Analysis and Interpretation, Design and Analysis of Algorithms and Discrete Structures given to **top 1%** of the batch *(2020)*
- Secured **All India Rank 28** in Joint Entrance Examination Advanced amongst 2,45,000 candidates *(2019)*
- Secured **All India Rank 76** in Joint Entrance Examination Main amongst 2,45,000 candidates *(2019)*
- Received **Institute Academic Prize** (top **25** out of 1100 students) for stellar academic performance *(2020)*
- Achieved **Global Rank 27** in the **Microsoft Q# Quantum Programming Contest** *(2020)*
- Among India's **top 27** students in INOI, Indian National Olympiad in Informatics, the penultimate stage of the International Olympiad in Informatics and represented India in **Asia Pacific Informatics Olympiad** *(2017)*

Internship and Research Projects

Contrastive Few Shot Learning with Domain Adaptation *June 2021 - Present*
Guide: Prof. Biplab Banerjee | Summer Undergradutate Research Program *IIT Bombay*

- Working on a **Contrastive Loss** based model for the **Few Shot** Learning problem trained on a **synthetic domain** and transferring it to real world domain with semi supervised fine tuning on few shot samples in PyTorch
- Modifiying Google Research's **SimCLR** model to account for domain adaptation by training it parallelly with an adversarial domain adaptation network to create a discriminative feature space for the target domain

Triptych Log Sized Ring Signatures for the Rust Programming Language *June - July 2021*
Applied Cryptography Internship *SB Cryptography Consulting*

- Investigated the cryptographic tools used in **Monero**, an open source privacy centric cryptocurrency, focusing on the details of **elliptic curve** cryptography, **ring** signatures and **zero knowledge** range proofs used in the protocol
- Implemented and published **Triptych**, a new logarithmic sized ring signature protocol which is presently being deployed into the **Monero** Cryptocurrency as an **open source** crate for the Rust Programming Language

Variations of the Freeze Tag and Angular Freeze Tag Problem *April - June 2021*
Guide: Prof. Sandor Fekete | Research Internship *TU Braunschweig*

- Worked on the computational complexity of the **Freeze Tag** problem on different classes of directed graphs
- Helped prove that the classical freeze tag problem is **NP Hard** even in the case of Directed Acyclic Graphs

Key Projects

Reinforcement Learning for Stock Trading *Summer 2020*
Institute Technical Summer Project *Institute Technical Council, IIT Bombay*

- Applied two Deep Reinforcement Learning based algorithms **Deep Deterministic Policy Gradient (DDPG)** and **Deep Double Q Learning (DDQN)** for developing an intelligent stock trading agent in TensorFlow
- Proposed a parallel double decision architecture to subdue any bias in decision making by the agent
- Trained the agent on a self made **OpenAI Gym** trading environment based on the data scrapped from the internet

Planet/Atmosphere Renderer using OpenGL *Summer 2020*
Seasons of Code *Web and Coding Club, IIT Bombay*

- Developed a realtime planet rendering system for the Earth and it's atmosphere using **OpenGL** in C++
- Implemented accurate **atmospheric shaders** running in real time by implementing **Rayleigh** and **Mie** scattering
- Implemented advanced lighting techniques using **Blinn-Phong Shader** in OpenGL Shader Language (**GLSL**)

PyDictionary: A Dictionary Module for Python *Autumn 2020*
Open Source Project | GitHub *IIT Bombay*

- Implemented a **web scrapper** to fetch word meanings, synonyms and antonyms from WordNet using **bs4**
- Created a simple to use Python API wrapper for the interface and published it as an open source python module on the **Python Package Index** achieving **201** stars on GitHub and **146,000** downloads per month

SlideCast: Low Bandwidth Lecture Delivery Software *Autumn 2020*
Guide: Prof. Varsha Apte | RnD Project *IIT Bombay*

- Developed a **cross platform python** application to record mouse events and lecture slide information with voice data to create a format that removes the need for video capture while delivering lecture videos
- Achieved size reduction by a **factor of 10** compared to recorded lectures captured using screen recorders
- Implemented a JavaScript **Progressive Web Application** to seamlessly playback and record the lecture files

RISC 16 Bit Processor in VHDL *Spring 2021*
Guide: Proj. Virendra Singh | Course Project *IIT Bombay*

- Created an efficient 22 state **finite state machine** implementing a CPU based on 16 bit instructions, 8 registers and 4MB of RAM following the RISC instruction set in **Quartus Prime** using VHDL targetting the Cyclone V SoC
- Created a **python based assembler** for translating assembly into machine code which is then executed on the CPU

Other Projects

Sparse Bayesian Learning for Compressive Sensing *Spring 2021*
Guide: Prof. Ajit Rajwade | Course Project : Advanced Image Processing *IIT Bombay*

- Used **Bayesian** Learning and the **EM** Algorithm for recovery of compressive measurements for improved signal recovery compared to standard methods based on **L1 Norm** establishing the **superiority** of Sparse Bayesian Learning

Coupled Tomographic Reconstruction of Brain MR volume slices *Spring 2021*
Guide: Prof. Ajit Rajwade | Course Project *IIT Bombay*

- Used measurements of brain MR volume slices at 18 random angles to reconstruct complete slices using **inverse radon** transformation in MATLAB and coupling using compressed sensing showing the benefits of compressive recovery

Online Competing and Development Environment *Autumn 2020*
Guide: Prof. Amitabha Sanyal | Course Project : Software Systems Lab *IIT Bombay*

- Created a cloud based IDE and a programming contest platform using **Django** and **Angular** supporting multiple languages with sandbox isolation on the server side to improve security and robustness of the workspace

Lattice Based Cryptography *Spring 2021*
Guide: Prof. Manoj Prabhakaran | Course Project : Cryptography and Network Security *IIT Bombay*

- Investigated the mathematical background behind **Lattices** and Lattice based constructions for various cryptographic tools and primitives leading up to **post quantum** cryptography and gave a seminar talk on the findings

Technical Skills

Programming Languages	Proficient in: C++, Rust, Python | Familiar with: Java, Bash, MATLAB, JavaScript
Development	HTML5, Bootstrap, Javascript, Angular, Flutter, CSS, Django, Flask, Git, MySQL
Data Science	Keras, TensorFlow, PyTorch, Matplotlib, NumPy, SciPy, Pandas,

Positions of Responsibility

Department Academic Mentor, *IIT Bombay* *June 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* *January 2021 - March 2021*

- Assisted the Professor of CS213M, Data Structures and Algorithms in conducting the course and created theoretical and programming **assignments** designed to test the understanding of the course content and implementation skills

Convener, *Web and Coding Club, IIT Bombay* *July 2020 - June 2021*

- Mentored **300+** students as one of the **Instructors** for **Machine Learning** Summer Technical Course organised for IIT Bombay students under Learner's Space and created reference material and assignments for the course

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 Machine Learning*, Operating Systems*, Foundations of Intelligent and Learning Agents*, Web Mining*, Learning with Graphs*
- **Mathematics:** Optimisation Models, Linear Algebra, Data Analysis and Interpretation, Calculus

* : *To be completed by December 2021*

Extracurricular

- Actively engaging in **competitive programming** hosted on various algorithmic programming sites including **Codechef**: Max Rating **2271** (6 star) and **Codeforces**: Max Rating **2085** (Purple) *(2020)*
- Ranked in top **110** among 3300 teams in **HCL** Cybersecurity Hackathon conducted by **IIT Kanpur** *(2020)*
- Core Team Member of **CovEd India**: an organisation for mentoring students during the pandemic *(2020)*