

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

190050089 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)

(2019)

(2020)

- Awarded 9 AP (Advanced Performer) grades for exceptional performance in courses including Data Analysis (2020) and Interpretation, Design and Analysis of Algorithms and Discrete Structures given to top 1% of the batch
- Secured All India Rank 28 in Joint Entrance Examination Advanced amongst 2,45,000 candidates
- 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
- Among India's **top 27** students in INOI, Indian National Olympiad in Informatics, the penultimate stage of (2017) the International Olympiad in Informatics and represented India in **Asia Pacific Informatics Olympiad**

# Internship and Research Projects –

### Contrastive Few Shot Learning with Domain Adaptation

Guide: Prof. Biplab Banerjee | Summer Undergradutate Research Program

June 2021 - Present 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 Applied Cryptography Internship

June - July 2021

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

Guide: Prof. Sandor Fekete | Research Internship

April - June 2021

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 202

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

Open Source Project | GitHub

Autumn 2020 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

Guide: Prof. Varsha Apte | RnD Project

Autumn 2020 IIT Bombau

• 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 Development Proficient in: C++, Rust, Python | Familiar with: Java, Bash, MATLAB, JavaScript 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

# Extracurricular \_

\*: To be completed by December 2021

- 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)

(2020)

• Core Team Member of CovEd India: an organisation for mentoring students during the pandemic