Omkar Shirpure
Computer Science & Engineering
Indian Institute of Technology Bombay

22B0910
B.Tech.
Gender: Male
DOB: 30/01/2004

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	7.81
Intermediate	Maharashtra State Board	Rajarshi Shahu Jr. Science College	2022	84.50%
Matriculation	Maharashtra State Board	Mahatma Phule English School	2020	99.00%

Pursuing a **Minor** in the **Entrepreneurship** at **Desai Sethi School of Entrepreneurship, IIT Bombay**

Scholastic Achievements

- Recipient of the ***Kishore Vaigyanik Protsahan Yojana Exam (KVPY)*** fellowship in **SX** division *(2021)*
- Recipient of the ***National Talent Search Examination (NTSE)*** Scholarship awarded by the **NCERT** *(2020)*
- Scored a percentile of **98.93** in **JEE Main** examination among **10,00,000+** aspirants all across India *(2022)*
- Scored a percentile of **96.87** in **JEE Advanced** examination among **1,50,000+** aspirants all across India *(2022)*
- Achieved **Silver** Medal in **Dr. H. Bhabha Balvaidnyanik** Exam, surpassing **80,000+** aspirants statewide *(2019)*

Key Projects And Experience

NN-based Natural Language Processing Model | *Learners' Space, 2023* *(Summer '23)*
Web and Coding Club *(IIT Bombay)*

- Applied **Skip-Gram model**, word-embedding in NLP using PyTorch and developed NN for **Sentiment Analysis**
- Implemented **optimisers** in **sequential** NN model for **Binary Classification** tasks leading in better test results
- Fine-tuned a pre-trained model to perform as a **Movie QnA** model which involved training on **bespoke self-curated data-set** specifically for movie domain and created an app in **Gradio** for easy and simplified interaction

Mess-I : Mess Digitalization | *Application Development Project* *(May '23 - Present)*
Institute Developers' Community *(IIT Bombay)*

- Maintaining a platform of digitalized mess management in **10+** hostels serving **10,000+** people on the daily basis
- Developed a **Flutter**-based **remote configuration** system for Mess-i Tablets which facilitates **remote debugging** of issue, also implemented an **'Extras'** feature to current dashboard streamlining access to additional meal options

InstiApp : Buy and Sell | *Application Development Project* *(Mar '23 - May '23)*
Institute Developers' Community *(IIT Bombay)*

- Worked on **InstiApp** - with over **10,000+** downloads and **2,500+** MAUs meeting the info-social needs of campus
- Created a user-friendly front-end interface allowing users to put their goods online on **Buy and Sell Portal** on InstiApp, **currently functioning feature** facilitating the campus residents in buying and selling their goods online

Image Processing & Object Detection Model | *Summer of Code* *(Summer '23)*
Web and Coding Club *(IIT Bombay)*

- **Metal Porosity Calculator** - Developed a sophisticated model using **OpenCV** to analyse highly magnified metal surface images utilizing methods as **thresholding** and **contour-placements**, with huge real-world **applicability**
- Developed a **live**, highly **configurable** settings system enabling parameter adjustments for more accurate results
- **Money Counter** - Developed **contour-based** object detection model utilising **Canny** edge-detection & data-filters

Computer Architecture Projects | *Course Project : CS-232 - DLDCA Lab* *(Autumn '23)*
Instructor: Prof. Biswabandan Panda *(IIT Bombay)*

- **Binary Music Encoder** - Engineered a **VHDL** based **sequential encoder** to precisely identify and convert binary value of notes into **synchronized byte output**, representing the chords their respective collection of notes
- **MIPS Programming** - Incorporated different algorithms in **MIPS** for a **query handling** program that sorts the inputs utilising **Heap Sort** algorithm and searches efficiently through **Binary Search** algorithm in the sorted data

Logs analysis - ELK Stack | *Stack Development Project* *(Aug '23 - Present)*
Institute Developers' Community *(IIT Bombay)*

- Studying about the setup and implementation of **ELK Stack** to analyse different kinds of system and server logs
- Establish an ELK cluster with **scalability** in mind, taking into account **data replication strategies** and a **distributed node configuration** to optimise log analysis and enhance stats for both existing and incoming logs
- Automating alerts within the Stack to ensure **quick response** to **critical system events**, minimizing downtime

File Compression System | *Course Project: CS 293 - Data Structures & Algorithm* *(Autumn '23)*
Instructor: Prof. Ashutosh Gupta *(IIT Bombay)*

- Modified the **Run-Length Encoding (RLE)** for binary strings, along with **gamma-bit encoding** for efficiency
- Implemented **Huffman encoding** for ASCII-character strings through Huffman tree construction along with an **Lempel-Ziv-1977** encoding solution to replace repetitive sub-strings by **back-referencing** to optimise encoding

Data Analysis Projects | *Course Project : CS 215 - Data Analysis and Interpretation* *(Spring '23)*
Instructor: Prof. Ajit V. Rajwade *(IIT Bombay)*

- **MRI Scans Analysis** - Analysed MRI scan images to calculate the **correlation co-efficient**, Quadratic Mutual Information **(QMI)** to measure dependence and repeated the same for negatives to compare the quantitative results
- **Kernel Density Estimation** - Utilized **MATLAB** to perform cross-validation on a data-set, by evaluating **likelihood, discrepancy** for values of **Standard Deviation**(σ), determining the best parameter for PDF estimation

Other Projects

Web Crawler | *Course Project : CS 104 - Software Systems Lab* *(Spring '23)*
Instructor: Prof. Kameswari Chebrolu *(IIT Bombay)*

- Developed a **Python-based** web-scraper that extracts data recursively, with command-line arguments for **target URLs** and **recursion depth** and feature that facilitates the searching for specific **keywords, file-types** in URLs
- Added **file-type classification** and an interactive HTML-based **flow chart visualization** of explored data, files

Mountain Cargo Bot | *Course Project : MS 101 - MakerSpace* *(Spring '23)*
Instructor: Prof. P. C. Pandey *(IIT Bombay)*

- Developed a versatile **Line Following bot**, adept at autonomously handling steep slopes, precise payload delivery
- Utilized **Arduino IDE** to program the bot along with **Fusion360**, **LaserCAD** and **Fractory** to precisely design 3D mechanical components and making use of **laser-cutting** and **3D-printing** for accurate production of the parts

Algorithm-Based Projects | *Self-Project* *(Autumn '23)*

- Utilised **Genetic Algorithm** to efficiently **compute roots** of **intricate equations** with user specified accuracy
- Applied **Minimax** algorithm in C for single-player mode in **Tic-Tac-Toe**, also an option for a two-player mode

Wordle-Solver | *Self-Project* *(Autumn '23)*

- Wordle-Game : Created the wordle game in **Python** from scratch considering all the rules and valid word-sets
- Developed wordle-solver incorporating **minimising average** obtaining best avg of **3.42** guesses for random cases

Positions Of Responsibilities

Core Member | *Developers' Community, IIT Bombay* *(Jan '23 - Present)*
*Part of **25**+ member team, responsible for design, development and maintenance of projects for institute*

- Developed new features like **Buy and Sell Portal** currently **active** and proved to be immensely successful with over **120+** product posts for sale since it's launch, ***General Championship Leader board** to the InstiApp
- Incorporated **remote configuration feature** in existing Mess-i application that facilitating remote **debugging**

Key Courses Undertaken

Computer Science	*Data Structures and Algorithms†, **Design and Analysis of Algorithms, *Discrete Structures, *Data Analysis and Interpretation, Software Systems Lab, **Computer Networks†, *Digital Logic Design and Computer Architecture†, **Operating Systems†, **Logic and TOC, **AI and ML†, Computer Programming and Utilization
Mathematics & others	Calculus, Linear Algebra, Differential Equations, *Introduction to Entrepreneurship, Quantum & Classical Physics, Physical Chemistry, Organic and Inorganic Chemistry, Biology, Makerspace, *Economics

†*Course has corresponding lab* **to be completed by Autumn '23* ***to be completed by Spring '24*

Technical Skills

Languages	C/C++, Python, Bash, x86 and MIPS Assembly, VHDL, DART
Software	Git, LaTeX, Markdown, MATLAB, Sed, Awk, GDB, Docker
Data Science Libs	NumPy, Pandas, MatPlotLib, SciPy, spaCy, PyTorch, TensorFlow
Development	CSS, Bootstrap, HTML, Javascript, Angular, Flutter, Django, TypeScript

Extracurricular Activities

- Achieved **A** grade in **both Elementary** and **Intermediate State Drawing** & **Sketching** Examinations *('18,'19)*
- Curated intuitive, activity-based questionnaires impacting over **20+** students under *National Service Scheme* *('23)*
- Assisted in Marketing Division of **E-Summit**, Flagship event of **Entrepreneurship-Cell, IIT Bombay** *('23)*