Ghugarkar Omkar Uttam | **190020044**
Chemical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 07-08-2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	
Intermediate	HSC	Bhartiya Jain Sanghatna	2019	85.69%
Matriculation	SSC	Priyadarshani High School	2017	92.20%

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

Scholastic Achievements

- Recipient of **INSPIRE** Scholarship awarded by Dept. of Science and Technology, Govt. of India *(2019)*
- Secured **District Rank 1** in Maharashtra Talent Search Examination (MTSE) *(2017)*
- Awarded **Maharashtra State Government Scholarship** for Secondary school education *(2014)*

Professional Experience

Vedantu | Data Science Intern *(May 2021 - Jul 2021)*

India's leading Online tutoring company

- Implemented a **Voice Modulation System** incorporating pitch, stress, jitter, shimmer, harmonic to noise ratios
- Designed an **index** for raw voice inputs used for quantifying the engagement of a teacher in a session
- Created a system to check background lights of the session, teachers' posture and distance from the camera

Machine Learning Studies | 3-D Computer Vision Intern *(Dec 2020 - Jan 2021)*

A Deep learning and Computer vision venture focusing on 3D face recreation

- Created **PCA** models for applying **dimensionality reduction** on shape and texture data of 3D faces models
- Implemented a deep learning based model to convert images of faces into their **hashed vectors in latent space**

Key Projects

SeDriCa, Innovation Cell, IIT Bombay | Sr. Computer Vision Engineer *(Sep 2020 - Present)*

One of the 11 finalists among 259 teams in Mahindra RISE Driverless Car Challenge

- Working in a team of **22** to develop **India's first Level 5** self driving car for Indian road conditions
- Implemented **VPS Net** for vacant marked parking spot detection and finalized the decision making procedure
- Created a procedure for detection of unmarked parking spots using **Inverse perspective mapping** and **Linknet**
- Estimating **velocity** of surrounding cars by tracking them, using their depths and optical flow as input

Bosch Traffic Sign Recognition Challenge | Inter IIT Tech Meet 9.0 *(Mar 2021 - Apr 2021)*

Demonstrated the project live at the Technical Meet and won Bronze medal among 23 IITs

- Worked in a team of **10** to create a **platform** employing intuitive and code-free training of Deep Neural networks
- Implemented a system to provide visualisations of **t-SNE, Grad-CAM** and **LIME** of intermediate layers
- Created a suggestions providing interface to improve the model based on **loss, f1-score and confusion matrix**
- Integrated system for **50+** traffic signs which consisted of extreme data imbalance and got an accuracy of **98 %**

Future Frames Prediction | Research Project *(Jan 2021 - May 2021)*

Prof. Amit Sethi, Department of Electrical Engineering, IIT Bombay

- Created a **unified GAN model** for predicting accurate and temporally consistent future frames over time
- Implemented a generator that can predict both future and past frames using the **retrospective cycle** constraints
- Used **Deformable convolutions** to learn geometric transformations and **Conv-LSTMs** for predicting frames
- Employed two discriminators to identify fake frames and fake sequences to get a **PSNR** value of **29.88**

Source code Plagiarism detection | Research Project *(May 2021 - Present)*

Prof. Prabhu Ramachandran, C-MInDS, IIT Bombay

- Creating a model to incorporate **writing pattern** and **abstract syntax grammar** to detect plagiarism in code
- Extracting features for writing patterns using **BERT encoder** and a **GRU** based network for abstract syntax
- Generating a **dataset** for plagiarised code and training the model as a **Siamese network** with L1 distance loss

Face Recognition with Liveliness Detection | COVID - 19 Project *(Jul 2020 - Aug 2020)*

Tinkers Laboratory, IIT Bombay

- Created a face recognition system which detects facial region of image using **Haar Cascade classifiers**
- Used a **transfer learning** model to generate embedding and recognize the face using the **SVM** algorithm
- Implemented a model using **3D Convolution layers** to check the authenticity of the person's face
- Integrated system for **10 users** having an accuracy of **96%** on face recognition and **90%** on liveliness detection

S.A.S.H.A - Smart Artificial System with Home Automation *(Feb 2020 - Jul 2020)*

Institute Technical Summer Project, IIT Bombay

- Led a team of 4 to create a **multi-feature, security-enabled Chatbot** that controls electric appliances
- Implemented features like general conversation using Natural Language Processing, news, weather report and jokes
- Programmed the code for a chatbot in python using multiple libraries, deployed on **Telegram platform**
- Created a system to allow user to log the commands into a file and created a home setup generator for integration
- Created a **user-interactive** website to facilitate house appliance modification and live tracking
- Employed environment-friendly and **energy-saving** features like **Green House mode** and **Night mode**

Neural Super Sampling *(Aug 2020 - Nov 2020)*

Course Project: Machine Learning for Remote Sensing - II | Guide: Prof. Biplab Banerjee, C-Minds

- Implemented the **ECCV 2018** paper **ESRGAN**: *Enhanced Super-Resolution Generative Adversarial Networks*
- Used the **Residual-in-Residual Dense Block (RRDB)** as the basic network building unit of the architecture
- Created relativistic **Generative Adversarial Network(GAN)** to let the discriminator predict relative realness
- Incorporated perceptual loss function to make the generated images more appealing to eyes

Comparative study of Image compression Techniques *(Jan 2021 - May 2021)*

Course Project: Introduction to Machine Learning | Guide: Prof. Biplab Banerjee, C-Minds

- Implemented K-Means algorithms, PCA technique and high-fidelity-generative-compression deep learning model
- Used **60** colour points for K-means and **150** components for PCA to get a PSNR values of **20** and **24**, respectively
- Used a GAN model with generator as an auto-encoder model with perceptual loss to get a PSNR value of **30**

Parallelizing A* and D* Lite using OpenMP and CUDA *(Jan 2021 - May 2021)*

Course Project: High Performance Scientific Computing | Guide: Prof. Shivasubramanian Gopalakrishnan

- Implemented **path planning** algorithms and reduced their time complexity using OpenMP and CUDA
- Used **8 parallel threads** to run OpenMP code and used **thread synchronization** technique with shared memory
- Reduced the time taken to run the program by around **5 times and 20 times** using OpenMP and CUDA

Position of Responsibility

Academic Mentor *(Jun 2021 - Present)*

Department Academic Mentorship Program (DAMP)

- Part of a 32 members team selected out of 80+ applicants after extensive interviews and peer reviews
- Mentoring **six** sophomores from the Department of Chemical Engineering on a **one-to-one** basis on various aspects of their life including their **academic** and **extra-curricular** pursuits in the institute

Technical Skills

- **Programming:** C++, Python, MATLAB, HTML, CSS, JavaScript, SQLite, Java, R, Julia
- **Software:** AutoCad, SolidWorks, Arduino IDE, Git, OpenFoam, LaTeX
- **Frameworks:** Bootstrap, TensorFlow, PyTorch, Keras, Robot Operating System (ROS), Gazebo, Django

Extracurricular Activities

Sports

- Completed a year-long training in **Lawn Tennis** under National Sports Organization (NSO) *(2019 - 2020)*
- Completed professional training to gain **Red Belt first White Stripe Rank** in **Tae-kwon-Do** *(2010 - 2015)*

Miscellaneous

- Investing actively in stock listed at **BSE** and **NSE** and reading literature to gain more insight for the same *(Present)*
- Pursuing a finance project in **Commodities and Currencies** under Finsearch program *(Present)*
- Mentored a group of **ten** freshers to implement Super Sampling under Summer of Code, WnCC *(2021)*
- Implemented **Q-Learning Algorithm** to learn an autonomous bot to find the shortest path in a given Maze *(2020)*
- Participated in the **Remote Controlled Plane** competition organised by Institute Technical Council and worked together in a team of 4 built a trainer plane robust to damages successfully from scratch *(2019)*