

MOHD SAFWAN

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EDUCATION

Indian Institute of Technology Bombay, Mumbai, India
Dual Degree, B.Tech + M.Tech in Electrical Engineering

ACHIEVEMENTS

- Secured *All India Rank 457/ Top 0.23%* in JEE Advanced 2017 out of 200,000 students
- Ranked in **Top 0.12%** in JEE Main 2017 out of 1.2 million students
- Was placed in Statewise **Top 1%** in NSEA (Astronomy Olympiad) and selected for INAO
- Winner of TechFest IITB's National Coding Challenge: **Enigma** from 10,000+ teams
- Won Scratch Day, coding competition organized by Web and Coding Club, IIT Bombay in '17
- 2 Time National Winner**, IPL Auction Competition '18 & '19 by Entrepreneurship Cell, IIT Bombay
- Secured 3rd place in annual Jigyasa: Science Quiz 2017 held by University of Mumbai
- City Winner** of Vodafone Derek's Faster Smarter Better Challenge **Twice** in '13, '14

EXPERIENCE

Summer Internship — Computer Vision Team, Augle AI (aule.ai) May - July '19

- Scene Text Recognition** for alphanumeric text on metal surface in unstable lighting. Used Histogram Equalization and Erosion to enhance images. Used a **Spatial Rectifier Network** to rectify the perspective of text images and a **Bidirectional LSTM with Attention** mechanism to recognize scene text.
- Person Identification** using Face and Palm-print images. Developed an object detection framework for edge devices. Developed pipeline for recognition which included *object detection, instance segmentation, pose estimation, and feature encoding*. Used a **Siamese Network** with hard negative mining.
- Crowd Counting** Used YOLOv3 detector and DeepSORT to track people and calculate crowd flow.

Research Project — Measurement of Fetal Head in Ultrasound Images Spring '19
Prof. Amit Sethi Electrical Engineering, IIT Bombay

Used PyTorch to implement U-Net architecture with a modified ResNet as encoder network. Implemented *elliptical weight map for loss* according to the bounding ellipse to get smoother boundary. Used **Dense Conditional Random Fields** post-processing for removing noise from segmentation mask

Research Project — Role of Reviews & Reviewer on Consumer Decisions Summer '18
Prof. Arti D. Kalro SJM School of Management, IIT Bombay

Scraped previous year's online reviews on Zomato using Selenium for Automated Web Scraping. For each restaurant, the reviews' content, likes, comments, photos, management responses and reviewer's total reviews, followers, images posted & other profile variables were extracted

KEY PROJECTS

Realtime Coherent Style Transfer for Videos — Deep Learning, Computer Vision [[Code](#)] Spring '19
Prof. Arjun Jain Computer Science & Engineering, IIT Bombay

- Implemented "ReCoNet: Real-time Coherent Video Style Transfer Network" architecture in PyTorch
- Used pretrained VGG19 for loss as described in "Perceptual Losses for Real-Time Style Transfer"
- Implemented a *Temporal Loss* by warping outputs using Optical Flow forcing smoothness in time domain

Petyr — An Open Source Python Library [[Code](#)] Summer '20

- Python library for generating, combining, estimating, and applying 2D transforms like Affine and Projective.
- Implemented multiple transforms in NumPy and wrote unit tests with complete code coverage.

Chord Sequence Extraction from Music — Machine Learning Summer '18
Institute Technical Summer Project IIT Bombay

- Processed the music data to extract \mathbb{R}^{12} Pitch Class Profile vectors using optimized Fourier Transform
- Achieved above 98% test accuracy with Additive χ^2 kernel and SVM Classifier

DL Research Papers Reproduced in PyTorch on GitHub [[Code](#)] Summer '19

- Auto-Encoding Variational Bayes — Diederik P Kingma, et al - ICLR 2014
- Wasserstein Generative Adversarial Networks — Martin Arjovsky, et al - ICML 2017
- A Neural Algorithm of Artistic Style — Leon A. Gatys, et al - Journal of Vision
- Generative Adversarial Networks — Ian Goodfellow, et al - NIPS 2014

OTHER PROJECTS

Panoramic Image Stitching — Computer Vision [[Code](#)]

Spring '19

Prof. Arjun Jain

Computer Science & Engineering, IIT Bombay

Normalized brightness in images using *Histogram Equalization* and then extracted *SURF* feature points. Matched the feature points using *RANSAC* and stitched the images by computing *Homography Matrices*

Inverse Compositional KLT Object Tracker — Computer Vision [[Code](#)]

Summer '20

Learning Project

Made an object tracker using the Inverse Compositional Kanade-Lukas-Tomasi framework to compute Optical Flow and track feature points within an ROI. Used DLT method to estimate the geometric transform.

16-bit RISC Microprocessor Design

Spring '19

Prof. Virendra Singh

Electrical Engineering, IIT Bombay

Designed and implemented a multicycle processor with RISC architecture using VHDL. The architecture was augmented with hazard mitigation techniques and data forwarding.

Walking Stick for Blind People

Jul'17 - Mar'18

National Innovation Club

National Service Scheme, Govt. of India

Manufactured a cost-effective walking stick for blind people that can detect obstacles and alert the user by programming an Arduino to use ultrasonic sensors for detection

InstiApp — Open Source App Development [[Code](#)]

Autumn '18

Developer Community

IIT Bombay

Part of 10+ membered team of developers involved in making an Open Source *Android App* for the residents of IIT Bombay. Solved many *UI/UX* as well as *core bugs* and also implemented various new features

Crypt Hunt Discord ChatBot

Autumn '18

Web and Coding Club

Institute Technical Council, IIT Bombay

Made a smart Discord Chatbot for conducting a QnA type treasure hunt for freshmen

POSITIONS OF RESPONSIBILITY

Convener — Web and Coding Club, IITB

Apr '18 - Mar'19

Organized and conducted various boot-camps, events, competitions while managing the club's resources with a long term goal of creating a thriving programming community in the institute

Mentor — School of Science, Maths & Physics Club, IITB

Summer '19

Mentored 4 freshmen during summers to study and implement basic DL algorithms from scratch

Instructor — Technical Summer School, Career Cell, IITB

Summer '19

Taught 100+ students to program in Python and concepts of Object Oriented Programming

TECHNICAL SKILLS

Programming - Python, C/C++, Embedded C, Java, MATLAB/Octave, Bash, VHDL

Frameworks/Libraries - PyTorch, TensorFlow 2.0, Keras, OpenCV, Scipy, Jupyter

Softwares - Vim, Git, GitHub, Android Studio, \LaTeX , AutoCAD, SolidWorks, Blender

Hardware - Arduino, Raspberry Pi, Beaglebone Black, 8051 controller

COURSES UNDERTAKEN

Key Courses - Deep Learning - Theory & Practice*, Computer Vision, Digital Image Processing*, Digital Signal Processing, Machine Learning for Remote Sensing, Control Theory*, Probability & Random Processes*, Computer Programming and Utilization, Signals and Systems, Data Interpretation and Analysis

Mathematics - Calculus, Linear Algebra, Differential Equations 1 & 2, Complex Analysis

*(to be completed in 3rd year)

EXTRACURRICULAR ACTIVITIES

- Volunteered in NSS to teach Mathematics to underprivileged school kids
- *Active player* in Indian Rainbow Six Siege community
- Mentored a team for *XLR8 2018* Robotics Competition who went on to win the **2nd prize**