Ameya Anjarlekar

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Education

- **Indian Institute of Technology Bombay** — Mumbai, India
  Bachelor of Technology in Electrical Engineering and Minor in Computer Science ; ***CPI: 9.57/10*** *(2017-2021)*
- **Ratanbai Walbai Junior College** — Mumbai, India
  High School; HSC% 89.85 *(2015-2017)*
- **Indian Education Society, Chandrakant Patkar Vidyalaya** — Thane, India
  Matriculation; SSC% 94.80 *(2005-2015)*

Publications

- Generalized Fractional Ambiguity Function and Its Applications
  Peeyush Sahay, Izaz Ahamed Shaik Rasheed, Pranav Kulkarni, Shubham Anand Jain, **Ameya Anjarlekar**, P. Radhakrishna Vikram M. G Circuits, Systems, and Signal Processing, Springer.
- Generalized Fractional Matched Filtering and its Applications
  P. Sahay, **A. Anjarlekar**, S. A. Jain, P. Radhakrishna and V. M. Gadre, Generalized Fractional Matched Filtering and its Applications, 2020 National Conference on Communications (NCC), Kharagpur, India, 2020, pp. 1-6.

Research and Technical Projects

- **Generalized Time-Frequency Transform in Radar** — IIT Bombay
  Guide: Prof. V.M. Gadre, Mr. Peeyush Sahay(DRDO) *(April 2019 - July 2019)*
  - Proposed **Generalized Frequency Ambiguity Function** and derived relevant properties. It was further applied for the parameter estimation of cubic chirp signals
  - Proposed envelope correlation using double chirp technique through which object parameters like acceleration, velocity and position of the object can be more accurately found out using Generalized Time-Frequency Transform
  - Proposed Adaptive Generalised Fractional Spectrogram for analysing multicomponent frequency modulated signal
  - Published a journal paper titled "Generalized Fractional Ambiguity Function and Its Applications" and conference paper titled "Generalized Fractional Matched Filtering and its Applications". Acknowledged for contribution in the paper "Adaptive Generalised Fractional Spectrogram and Its Applications" which is under review
- **Supervised Detection of Tennis Ball from Camera Stream [Doc][Code]** — IIT-B Mars Rover Team
  University Rover Competition(URC 2019) *(Aug 2018 - present)*
  - Working towards the ball detection sub-task required for target detection in autonomous operations of the rover
  - Created a dataset comprising of over 80,000 examples and further refined using **Data Augmentation** procedures
  - Each test image was pre-processed using **circular hough transform** to extract features regarding shape
  - Devised a model algorithm for the task which comprises of using **transfer learning** by initially training on a tennis match dataset and then transferring the trained weights to re-train on the generated dataset
- **Image Reconstruction for Parallel MRI [Doc][Code]** — IIT Bombay
  Guide: Prof. V.M. Gadre *(September 2018 - June 2019)*
  - Implemented a modified version of the GRAPPA algorithm on **SDK** for image reconstruction during **Parallel MRI** technology which would be used in the indigenous state of the art MRI machine developed at IIT Bombay
  - Estimated the dependancy of neighbouring pixels by using a modification of the linear least fit method
  - Tested the algorithm on Matlab and then implemented on Xilinx Zynq-7000 FPGA Board
  - Awarded the **Undergraduate Research Award**(**URA**) by IIT Bombay for this notable contribution
- **DNA Sequencing Through Neural Networks** — IIT Bombay
  Guide: Prof. Manoj Gopalkrishnan *(November 2018 - July 2019)*
  - Developed a novel technique to estimate the **conditional probability** distribution from samples using **Kernel Density Estimation** technique applied along with Artificial Neural Networks.
  - Obtained the condition on the distribution for the test set of samples using **likelihood maximization**

- Achieved **MAE** of around 0.2 for the range of conditional values in [10,100] with just **2000** sample points.
- Applied the above model to develop a **state of the art** technique to correctly predict the micro-scale spatial information like the relative positions of bio-molecules without the need of **conventional optics**

- **Signal Distortion Correction [Report][Code]** IIT Bombay
  Guide: Sunita Saragawi/Prasanna Chaporkar *(Sept 2018 - Nov 2018)*
  - Studied the **"RML2018.10a"** dataset with the help of relevant papers and garnered vital information related to frequency analysis of a sound wave using its samples taken with respect to space and time
  - Implemented a CNN model for the frequency estimation of various signals and analyzed its performance over various Signal to Noise (**SNR**) ratio and obtained improved results over a certain range of SNR values

- **Text Categorization [Report][Video]** IIT Bombay
  Institute Technical Summer Project *(May 2018 - July 2018)*
  - Implemented a **neural network** code from scratch to classify **20 Newsgroups** dataset and achieved an accuracy score comparable to the built-in Scikit-learn function for the same
  - Used in-built Scikit-learn functions for neural networks and Naive-Bayes algorithm for the same dataset and investigated the test accuracy for various function input parameters

- **Modelling of PMDC motor and analyzing flux patterns in C-Core** IIT Bombay
  Guide: Prof. Baylon G. Fernandes *(May 2018 - July 2018)*
  - Simulated and analyzed the flux patterns of a C-Core Electromagnet using the principle of FEM (Finite Element Method)with the help of simulation software-Magnet
  - Modelled a Brush-less PMDC (Permanent Magnet DC)motor design as per an IEEE paper using Magnet and studied its behaviour by varying design parameters

Course Projects:

- **Use of Residuals for Image Denoising (Guide: Prof. Ajit Rajwade)**: Implemented a denoising algorithm using the residual image. Also, studied and implemented metrics for quality of image denoising without the use of the reference image. Report can be found here
- **Wine Quality Detection (Guide: Prof. Sunita Saragawi)**: Implemented regression decision tree which included both pre and post pruning for classification. Achieved **second** best error in Kaggle competition
- **Microprocessor Design (Guide: Prof. Virendra Singh)**: Designed a 16-bit microprocessor capable of performing arithmetic, logical, read, write, jump, branch equality and many more complex operations
- **Grab Circuit (Guide: Prof. M.B. Patil)**: Designed LED circuit which detects the first out of four contestants pressing the buzzer, thereby locking the circuit-paths for the rest of the contestants

Scholastic Achievements

- Pursuing minor in **Computer Science and Engineering** along with **honors** in Electrical Engineering [present]
- Awarded **Undergraduate Research Award** (URA-01) by IIT Bombay for contribution to MRI technology [2019]
- Received **IRCC Award** for excellent R&D work in Radar Signal Processing [2019]
- Secured an **AP** grade (awarded to less than 1% students) in course on differential equations (MA 207) [2018]
- Secured an All-India Rank **132** in **JEE - Advanced** out of selected 0.25 million students [2017]
- Secured an All-India Rank **215** in **JEE - Main** out of around 1.1 million students [2017]
- Awarded fellowship by the Indian Institute of Science (IISC), Bangalore for securing an All-India Rank of **243** in **KVPY**(Kishore Vaigyanik Protsahan Yojana)out of around 80,000 students [2017]
- Placed among the top 500 students of the nation to be selected for the **Indian National Maths Olympiad** [2015]
- Secured the nationwide top 1% position in **NSEP** (National Standard Examination in Physics) conducted by IAPT (Indian Association of Physics Teachers) [2016]
- Awarded **A2** certificate by Goethe-Institut for **German language** [2014]

Technical Skills & Interests

Programming languages and libraries	C++, Python, Pytorch, Keras, OpenCV, ROS, Scikit-learn, VHDL
Softwares	Matlab, Solidworks, Quartus, Magnet, NGSpice, GNUPlot

Key Courses Taken

- **Probability and Statistics**: Data Analysis and Interpretation, Random Processes*, Optimization techniques
- **Computer Science**: Machine Learning, C++ , Data Structures and Algorithms, Digital Image Processing*
- **Mathematics**: Calculus, Linear Algebra, Differential Equations(I and II), Complex Analysis
- **Electrical Engineering**: Signals and Systems, Electronic Devices, Digital Systems, Microprocessors, Electric machines and Power Electronics, Network Theory, Analog Systems, Electromagnetic Waves, Communication Systems

* to be completed till 5th semester

Positions of Responsibilty

Coordinator: Mood Indigo 2018

- Created and modified database of judges by interacting with various people involved in fine arts
- Selected and invited judges from all over the nation and took care of their hospitality

Teaching Assistant

- Teaching assistant for courses PH 108 (Electricity and Magnetism), MA 108 (Differential Equations)
- Head teaching assistant for MA 207 (Differential Equations II)

Instructor: Machine Learning Bootcamp

- Conducted sessions on Deep Learning, SVM, KNN, Bayesian Models and Decision Trees

Extra-curricular Achievements

- Won the table-tennis doubles tournament organized by NCC during their Annual Training Camp. [2017]
- Participated in **Line Follower Bot competition** organized by Electronics and Robotics Club, IIT Bombay [2017]
- Completed a 2 semester **NCC** (National Cadet Corps) training and attended its **Annual Training Camp** [2017]
- Completed Summer of Science project in **Construction Features of Electrical Machines** [2017]