

## EDUCATION

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- **Indian Institute of Technology Bombay** Mumbai, India  
*Bachelor of Technology in Electrical Engineering (with honors); CPI: 9.64/10* (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)

Completed a **minor** in **Computer Science and Engineering**

## PUBLICATIONS

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- **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. Generalized Fractional Ambiguity Function and Its Applications. Circuits Syst Signal Process 39, 4980–5019 (2020)
- **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, doi: 10.1109/NCC48643.2020.9055991
- **A weighted generalized coherence approach for sensing matrix design (submitted to ICASSP 2022)**  
Ameya Anjarlekar and Ajit Rajwade, "A weighted generalized coherence approach for sensing matrix design,"

## INDUSTRIAL EXPERIENCE

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- **Quantitative Researcher (Current)** Quadeye Securities
  - Responsible for the improvement and successful operations of trading strategies in 2 regions
  - Created and modified alphas to increase volume, fill Ratio and netPnl/volume
- **Video Compression for efficient Remote Support video storage [Doc]** Daikin Industries  
*Guide: Mr. Hari Prasad, Mr. Kumata Toshiaki* (June 2020)
  - Achieved around **70% video data compression** by developing a **Hitomi Camera**-inspired algorithm
  - Devised a video reconstruction algorithm by exploiting the spatial as well as temporal redundancy through **DCT** basis or a **learned dictionary**. The reconstructed video achieved a **PSNR** of around **24**
  - The video compression algorithm is **data independent** (when DCT used) and quality of reconstructed images is significantly improved (around 3-4 PSNR) by replacing DCT basis with learned dictionary

## RESEARCH AND TECHNICAL PROJECTS

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- **Sensing Matrix Design with Weighted Mutual Coherence** IIT Bombay  
*Guide: Prof. Ajit Rajwade* (August 2020 - Present)
  - Designed sensing matrices by minimizing weighted (determined from training data) **mutual coherence**.
  - Proposed an approach to design weights to handle rotation, scaling and translation of images
  - Currently working on designing efficient sparse binary sensing matrices through weighted mutual coherence minimization. The sensing matrix is designed for use in group testing for **COVID 19**
- **Compressed Sensing with Deep Image Prior** UC San Diego  
*Guide: Prof. Piya Pal* (July 2020 - Present)
  - Working to develop **Deep Image Prior** based compressed sensing approach for the case of limited data
  - Proposed a **rectified sparse Bayesian** based learning technique for training of the model

- **Generalized Time-Frequency Transform in Radar** IIT Bombay  
*Guide: Prof. V.M. Gadre, Dr. Peeyush Sahay(DRDO)* (April 2019 - May 2020)
  - Proposed **Generalized Frequency Ambiguity Function** for parameter estimation of chirp signals
  - Developed **Generalized Fractional Matched Filter** by which object parameters like acceleration and velocity can be more accurately estimated using Generalized Time-Frequency Transform
  - Received **IRCC Honorarium** for excellent R&D work in Radar Signal Processing
- **Supervised Detection of Tennis Ball from Camera Stream** [Doc][Code] IIT-B Mars Rover Team  
*University Rover Competition(URC 2019)* (Aug 2018 - Dec 2019)
  - Completed the **ball detection** task required in the **autonomous** operations of the rover
  - Devised an algorithm for the task which comprises of first pre-processing the test images, then using **transfer learning** by which we re-train an already trained Alexnet model on our generated dataset
  - Each test image was pre-processed using **circular hough transform** to extract features regarding shape
- **Image Reconstruction for Parallel MRI** [Doc][Code] IIT Bombay  
*Guide: Prof. V.M. Gadre* (September 2018 - June 2019)
  - Implemented a modified version of **GRAPPA** algorithm on **Xilinx Zynq-7000 FPGA Board** for image reconstruction used in the indigenous MRI machine at IIT Bombay
  - Awarded **Undergraduate Research Award** (URA-01) by IIT Bombay for this 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.
  - 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**

#### Key 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](#)
- **Blind Compressed Sensing (Guide: Prof. Ajit Rajwade):** Reviewed various theoretical derivations of Blind Compressed Sensing and implemented the corresponding algorithm for joint estimation of dictionary and images. Report can be found [here](#). Mathematical analysis is provided [here](#)
- **Target Parameter Estimation from Compressive Measurements (Guide: Prof. Vikram Gadre):** Estimated parameters of rotating targets through Doppler and Micro-Doppler estimation of corresponding radar signals from their compressive measurements. Report can be found [here](#).
- **Distortion Correction for Modulation Recognition (Guide: Prof. Sunita Saragawi):** Implemented CNN model for the frequency estimation of signals in the "RML2018.10a" dataset and analyzed its performance over various Signal to Noise (SNR) ratios. Report can be found [here](#). Code is provided [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

#### ACADEMIC RESPONSIBILITIES

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##### Department Academic Mentor

- Part of a team of **35** mentors after rigorous rounds of extensive peer reviews and interview
- Mentoring **6** sophomore students by providing academic guidance and help in other non-academic issues

##### Teaching Assistant

- Responsible for conducting tutorial sessions and evaluations for courses **PH 108** (Electricity and Magnetism), and **MA 108** (Differential Equations I)
- Head teaching assistant for the course **MA 207** (Differential Equations II) and responsible for conducting doubt solving sessions, paper setting and evaluations

##### Instructor: Machine Learning Bootcamp

- Conducted sessions on Deep Learning, K-Means, EM algorithm, Bayesian Models and Decision Trees

## SCHOLASTIC ACHIEVEMENTS

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- Awarded the 'Institute Technical Special Mention' for contribution to technical sphere in the institute [2020]
- Shortlisted as one of the Top **34** teams in the **Mercedes-Benz Digital Challenge**, India [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** and an All-India Rank **215** in **JEE - Main** [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]
- 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-Institute for **German language** [2014]

## TECHNICAL SKILLS & INTERESTS

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Skills: C++, Python, Matlab (Expert), Keil, VHDL, Pytorch, Keras, OpenCV, Scikit-learn, L<sup>A</sup>T<sub>E</sub>X  
Interests: Signal/Image Processing, Compressed Sensing, Deep Learning, Statistics, Reinforcement Learning

## KEY COURSES TAKEN

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- **Probability and Statistics:** Data Analysis and Interpretation, Probability and Random Processes
- **Computer Science:** Introduction to Machine Learning, Design and Analysis of Algorithms, Data Structures and Algorithms, Digital Image Processing, Advanced Image Processing, Reinforcement Learning (edX), Theoretical Machine Learning, Introduction to Programming
- **Mathematics:** Real Analysis, Linear Algebra, Differential Equations(I and II), Complex Analysis
- **Electrical Engineering:** Signals and Systems, First Course in Optimization, Microprocessors, Wavelets, Digital Communications, Network Theory, Digital Communication, Digital Signal Processing

## EXTRA-CURRICULAR ACHIEVEMENTS

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- Responsible for conducting fine arts competitions for Mood Indigo, annual social fest of IIT Bombay [2017]
- Completed **NCC** (National Cadet Corps) training and attended its **Annual Training Camp** [2017]
- Volunteered career counseling drive organized by Abhyuday (Social service body of IIT Bombay) [2017]