# VARUN DESAI

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## ACADEMIC DETAILS

| Year | Degree / Board | Institute | GPA / Marks(%) |
|---|---|---|---|
| --- | B.Tech in Electrical Engineering | Indian Institute of Technology, Delhi | 9.602 |
| 2018 | CSBE | DPS Bopal, Ahmedabad | 93.4% |
| 2016 | CBSE | DPS Bopal, Ahmedabad | 10 |

## SCHOLASTIC ACHIEVEMENTS

- **Department Rank 2**, *Electrical Engineering Department*: on the basis of CGPA after 7 semesters, out of 90+ students
- **Honoured with IIT Delhi Merit Prize** four times consecutively: For outstanding academic performance in Semesters-I, II, III, IV
- **Kishore Vaigyanik Protsahan Yojana(KVPY 2018)**: Conferred fellowship through 2-tier process by DST, Govt. of India
- **Awarded Certificate of Merit** by DPS Bopal and CBSE for consistent academic excellence; outstanding performance in AISSE

## INTERNSHIPS

- **APT Portfolio Pvt. Ltd., Bangalore** : *RTL Design and Verification*, FPGA-based Simulation Acceleration [May,2021-July,2021]
  - Ideated, designed, tested architecture for emulating **RTL** model on an **FPGA** to speed up verification process more than **100x**
  - Developed and tested digital circuit using **Verilog** to (de)serialize data to and from compressed format for efficient transmission
  - Used **Riviera-PRO** and Cocotb to debug and test design, Xilinx **Vivado** for synthesis and ensuring timing requirements
- **Greenleap Robotics, Delhi** : *Automated Fault Diagnosis of Solar Panels* [May, 2020 - July, 2020]
  - Implemented Machine Learning based **Computer Vision** techniques along with statistical methods to automate fault diagnosis
  - Trained a **ConvNet** with state of the art architecture(**Mask-RCNN**) to localize solar panels in aerial drone-shot thermal images
  - Used Image Processing and Unsupervised Learning(**DBSCAN algorithm**) to detect temperature hotspots as statistical outlierss
  - Achieved over **90%** precision and recall on test dataset; developed simple **frontend** using python libraries such as tkinter

## PROJECTS

- **Analog ConvNet** | *Prof. Debanjan Bhowmik, Neuromorphic Training Accelerator* [January, 2021-Present]
  - Matrix multiplication occurs in O(1) time in a **crossbar array** but with volatile **transistors** various non-idealities hinder scalability
  - Introduced **weight decay** of the synaptic device while training by mathematically modelling the decay curve; used **tensorflow**
  - Experimented with different **quantization** precision, rate of decay, and distributing the weight between volatile and non-volatile devices
- **Navigo**: *Winner, i4 Challenge by IIT Delhi*; Solution for problem posed by IRD, IIT Delhi [May, 2020]
  - Capacitated Vehicle Routing formulated as an **Integer Programming** problem; Researched existing solutions and improved upon them
  - Developed attractive, aesthetic front-end for various stakeholders; highlights path taken for every agent; used **JS**, Flask
  - Awarded **best solution** after evaluation by professors & experts in the field, out of **70+ submissions** for 28 proposed problems
- **Planning and Estimation for Autonomous Systems** | *Prof. Rohan Paul* [February,2021-May,2021]
  - Implemented value iteration for solving an MDP, **reinforcement learning** algorithms(SARSA,Q-learning); Viterbi Algorithm for **HMMs**
  - Devised algorithm for estimating position of multiple agents with no data association as an extension to **Kalman Filtering**
- **Machine Intelligence & Learning** | *Prof. Prathosh AP* [August,2020-January,2021]
  - EM for GMM implemented, Used **PCA** for dimensionality reduction on Medical MNIST dataset, reduced convergence time
  - Neural Net(L1 and L2 regularization), LeNet, AlexNet, VGG-16 trained with Adam Optimizer using **PyTorch** on HPC, IITD
- **Blind Source Separation** | *Prof Lalan Kumar, Digital Signal Processing* [March, 2020]
  - Implemented Independent Component Analysis algorithm to separate a mixture into original sources with no prior information
  - Investigated different approaches to ICA namely MLE, maximising Kurtosis or Neg Entropy; Implemented **Fast-ICA** in MATLAB
- **Triangulation of 3D Objects** | *Prof. Subodh Kumar, Data Structures and Algorithms* [November, 2019]
  - Approximated 3D objects as collection of triangles: **Graph** used to store the triangles as nodes and vertices as edges.
  - Breadth/Depth First Search, **Dijkstra's Algorithm** implemented for answering various queries about orientation of objects
- **Priority Based Job Scheduler** | *Prof. Subodh Kumar, Data Structures and Algorithms* [October, 2019]
  - Implemented **Double Hashing**, and separate chaining using binary search trees from scratch on Java, to decrease lookup time
  - Implemented a Job Scheduler, which stores jobs in a **MAXHEAP** and executes them on basis of it's projects priority

## TECHNICAL SKILLS

**Langauges**: Python, (System)Verilog, MATLAB, Java, C, SML | **Tools**: LTSpice, KiCAD, Aldec Riviera-PRO, Arduino, Quartus

## POSITIONS OF RESPONSIBILITY

- **IIT Delhi OnAir:** Station Manager (Student Head); *Official Media Body for IIT Delhi* [March, 2019 - Present ]
  - Managed a team of **30+** people, generated **10M+** hits on YouTube by producing diverse content including **20+ videos**
  - Innovated the yearly operations for the online semester, achieving **98%** YoY increase in watch-time and **71%** YoY increase in views
  - Coordinated collaborations with **Netflx, TVF** for live interviews with cast of Netflix Special **Alma Matters**, **Aspirants**; **6M+** impressions
- **Board for Student Publications**: Recognized as **Best Technical Editor** for punctuality and quality of work [April, 2019- August,2020]