Goru Meher Ritesh Kumar | **160070048**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Male**
DOB: 10-15-1999

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2020	8.85
Intermediate/+2	Board of Intermediate Education,AP	Sri Chaitanya College	2016	98.20
Matriculation	Board of Secondary Education,AP	Dr.K.K.R's Gowtham School	2014	9.80

Pursuing a **minor degree** in **Computer Science and Engineering**

Academic and Scholastic Achievements

- Awarded **AP** grade for exceptional performance in **Deep learning: Theory and Practice** course ['18]
- Awarded **Institute Technical Special Mention** for exemplary contribution to the technical sphere of IIT-B ['18]
- Secured All India Rank **903**, **469**, **129** in **IIT JEE-Advanced**, **JEE-Mains paper-1,2** respectively ['16]
- Attained State Rank **56** in **EAMCET-AP**, among 0.3 million students ['16]
- Recipient of the prestigious Kishore Vigyanik Protsahan Yojana (**KVPY**) Fellowship in basic sciences ['15]
- Awarded National Talent Search Examination Fellowship (**NTSE**) by NCERT, Govt. of India ['14]

Research Experience

Deep Imitation Learning For Robotic Surgery | Research Internship [May'19-present]
Guide: Prof. Juan.P.Wachs | Purdue University
- Automated Surgical pick & place task with the **DaVinCi**, a surgical system used in laparoscopic surgery
- Conducted an extensive **literature survey** on **Imitation learning** and it's advances in robotics
- Designed a **Behavioral Cloning** based model using **LSTM** and **Convolutional Neural Networks** in Pytorch
- Recorded the joint and image data of the robot using **ROS** framework and used **VGG19** for image feature extraction
- Presented it in **SURF Symposium** and showcased it to **Intuitive Surgical** (Creators of the DaVinci robot)
- Currently working on **Oneshot** imitation learning methods for the same with **VREP** simulated model of the robot

Perceptual distance metric learning for Odor Data [Dec'18-Jan'19]
Guide: Prof. Subhasis Chaudhuri
- Modelled the **similarity** of **odor data** using a **deep metric learning** approach (**PerceptNet**)
- Incorporated the **uncertainty** of perceptual similarity response in the modelling process
- Evaluated the performance of the method by projecting data in lower dimension space using **t-SNE** and **PCA** methods

Active distance metric learning [Jul'19-present]
Guide: Prof. Subhasis Chaudhuri *RnD Project*
- Explored different **active learning** strategies for sampling the most **informative** samples for annotation
- Currently developing an algorithm for **dynamically learning** the sampling policy

Under-Graduate Thesis [Aug'19-present]
Guide: Prof. Vivek Borkar and Prof. Nikhil Karamchandani *BTP*
- Explored **Gossip** algorithms which are used in peer-peer communication protocols
- Currently implementing an algorithm for **distributed Stochastic Gradient Descent** with **straggler** mitigation

Technical Projects

Mahindra Rise Driverless Car Challenge | Innovation Cell IITB [Nov'17-Present]
*Part of a team of 20 members aiming to build **SeDriCa; India's** 1^{st} **driverless car***
- One of the **11 finalists** out of **259** teams (IV Level); Received a **Mahindra E2O** for further development
- Implemented a model-based approach for object tracking from 3D-Lidar Data using **Rao-blackwellised** particle filter
- Constructed an **occupancy grid** with a **recursive update** for coarse and fine clustering of 3D-Lidar Data
- Built a Semantic Segmenter based on the FCN as described in the paper of **Linknet**
- Trained an image classifier using **transfer learning** based on **resnet50** and benchmarked it on **gtsrb** dataset
- Trained **Yolo V2** and **Yolo V3** detection algorithms in the paradigm of autonomous vehicles and made custom datasets for speed bump and traffic lights

Student Design Challenge | American Society of Mechanical Engineering [Nov'16-Nov'17]
***Overall first in World finals** out of 8 teams from 4 countries held at Tampa, Florida|won **4000$** as a prize money*
- Coordinated in a team of 10 to build a bot capable of performing **five distinct tasks** for competition
- Designed a **Ball Screw** subsystem for the weight lifting task and simulated its stress analysis in **ANSYS**
- Headed the **electrical subsystem** and programmed the microcontrollers used for the control of all the subsystems
- Designed the circuit boards required in **EAGLE** and modelled the wire routing in **Solidworks electrical**

Course Projects

Action Recognition using Recurrent Attention | Deep Learning [Jul'18-Nov'18]
- Extended Google DeepMind's paper on **Recurrent Models of Visual Attention** for action classification in videos
- Used **REINFORCE**, a policy gradient algorithm to predict a timestamp around which network should pay **attention**, On contrary to processing the complete video, Thus **reducing the computation time** by a substantial amount
- Used **optical flow** to compute **motion features** from a set of frames around a given time instant

Syntactic sentence parsing using Recursive Neural Networks | Machine Learning [Oct'18-Nov'18]
- Applied a NN recursively to build a **parsed tree-structure** based on the phrasal category prediction of the words
- Converted the **Penn Treebank** dataset to a binary form using **Chomsky Normal form** and **Unary Collapsing**
- Reduced the syntactic phrasal tags to 6 subcategories and used pre-trained **word embeddings** for training

Filter Design | Digital Signal Processing [Mar'19-Apr'19]
- Designed **Butterworth**, **Chebyshev** and **Elliptical IIR** Filters of given specifications in **MATLAB**
- Implemented **FIR** filters of same specifications using window function generation for generating **kaiser window**

Faster Coarse Acquisition of IRNSS data | Digital Signal Processing [Mar'19-Apr'19]
- Using the data collected from IRNSS **Satellite** enchanced coarse acquisition by analysing the signal in fourier domain
- Implemented circular-convolution in frequency domain & found out that it's faster than serial search

Monte-Carlo Simulations | Markov Chains and Queuing Systems [Mar'19-Apr'19]
- Generated samples of the **Raised cosine distribution** from Uniform distribution using **Rejection sampling**
- Got an acceptance rate of 1/M with the finite bound value M, thus verifying the theory of rejection sampling

Audio Encryption and Decryption | Analog Lab [Mar'18-Apr'18]
- Encrypted an input signal by adding a **chaotic noise** generated by a **III order chaotic oscillator**
- Decrypted at the receiving end using an oscillator and a **coupler (initial condition)**
- simulated the entire system on **NGSPICE** and implemented it using TL072 OPAMPs

IITB RISC Processor | Micro-Processors [Oct'18-Nov'18]
- Designed and implemented a 16-bit, 6-stage **pipelined RISC processor** based on Turing complete ISA in VHDL
- Encoded a total of 15 instructions with three machine-code formats, good enough to solve complex problems

Smart Solar Lamp | Electronics Design Laboratory [Jan'19-Apr'19]
- Made a Solar chargeable LED lamp with a battery life of **8 hrs** and with normal, **smart**(in response to motion) modes
- Integrated **overcharge** and **over-discharge protection** into the charger circuit to improve battery life

Technical Proficiency

Programming Languages	C, C++, Python, VHDL, MATLAB
Softwares and Tools	Arduino, SolidWorks, ANSYS, EAGLE, NGSPICE, QUARTUS, ROS
Machine Learning Libraries	Pytorch, Tensorflow, keras

Position of Responsibility

MANAGER, Innovation Cell - IIT Bombay [Apr'18-Apr'19]

*Innovation Cell aims to facilitate **technical start-ups** and foster an atmosphere of **innovation** and **entrepreneurship***
- Presented Autonomous Drone technology at the **JP Morgan Chase**, **TED Talks** for an audience of 2000+ employees
- Delivered a lecture on Introduction to Machine learning for the Summer Induction Program
- Showcased **SeDriCa** at TechConnect'17, organized by Techfest with a footfall of over 1,69,000
- Organized the recruitment orientation and selection for Team SeDriCa for over 250 undergraduates and postgraduates
- Presented various projects of Innovation Cell at the Tech and R&D Expo conducted at IIT Bombay

Relevant Courses

Computer Science	Deep Learning, Machine Learning, Automatic Speech recognition*, Learning Agents*, Digital Image Processing*, Operating Systems, Data Structures & Algorithms
Mathematics	Optimization*, Markov Chains & Queuing systems, Numerical Analysis, Calculus, Linear Algebra, Differential Equations, Complex Analysis, Probability and Random Processes
Core Courses	DSP, Control Systems, Digital & analog communications, Network Theory, Analog Circuits, Digital Systems, Power Systems, Micro Processors, EM Waves

**to be completed by Nov'19*

Extracurriculars

- Awarded Hostel Technical Special Mention for exemplary contribution towards Hostel Tech ['18]
- Successfully completed Summer School of Sports in Football held in summer IIT Bombay [May'17-Jun'17]
- Volunteered for Green Campus, National Social Service scheme, IIT Bombay [Aug'16-Apr'17]
- Pre-finalist in Spell-bee conducted by Sakshi india ['13]
- Stood first in the district of East Godavari, AP in Quiz Competition and second in Map Pointing test ['13]