

Hitesh Kandala

Indian Institute of Technology Bombay – India

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Education

Bachelor of Technology | Indian Institute of Technology Bombay July'18-Present
Department of Electrical Engineering GPA (till 4th semester) : 8.77/10
Pursuing a bachelor's degree with **major** in **Electrical Engineering** and **minor** in **Computer Science**

Academic Achievements

- Secured All India Rank **168** in **IIT JEE-Advanced** out of 230,000 aspirants ['18]
- Achieved All India Rank **37** in **JEE-Mains** out of 1.2 million candidates ['18]
- Received the prestigious **KVPY** Fellowship for two consecutive years with **AIRs 102** and **517** ['18,'17]
- Recipient of **NTSE** Fellowship awarded by NCERT, Govt. of India ['16]

Research Experience

PNEUMONIA DETECTION

Deep Learning Researcher

Endimension Technology Pvt. Ltd.

Jul'20 - Present

- Implemented a Tensorflow model to detect the regions of **pneumonia** from chest X-rays of Indian patients
- Built pre-processing pipeline to feed images of different formats such as **Dicom**, **NIfTI**, etc using Python
- Optimized different object detection models pretrained on ImageNet images to improve the accuracy
- Achieved Sensitivity and Specificity of more than **90%** on the test dataset, consisting over 3000 images

BAYESIAN MULTI-TASK LEARNING

Guide: Prof. Biplab Banerjee | Deep Learning

Research Project

Dec'19-Mar'20

- Developed a model for simultaneous **Image Segmentation** and **Depth Estimation** on Cityscapes dataset
- Utilized the shared feature space of the network using Bayesian probability distribution for faster inference
- Implemented an attention based **U-net** architecture for implementing the encoder-decoder part of network

CAPTIONING AND MULTI-LABEL CLASSIFICATION

Guide: Prof. Biplab Banerjee | Deep Learning

Research Project

Jul'20-Present

- Developing model capable of **captioning** and **multi-label** classification simultaneously from single image
- Model based on the **Transformer** architecture will be trained on the **UC Merced Land Use** dataset

Machine Learning Projects

MAHINDRA RISE DRIVERLESS CAR CHALLENGE

One of the 11 finalists among 259 teams (prize money - \$ 1 million)

Innovation Cell

Apr'19-Apr'20

- Part of team **SeDriCa**, which aims to develop **India's 1st self-driving car** targeting level 5 autonomy
- Used transfer learning to train a Traffic Sign and Traffic Light classifier based on **Resnet50** and **Resnet152**
- Implemented submodules in **path planning** and **decision making** subsystems to avoid obstacles and optimize path of vehicle accounting for the information from *traffic signs, traffic signals* and *speed bumps*

INTRUSION DETECTION SYSTEM

Seasons of Code (SoC) | Web and Coding Club (WnCC)

Summer Project

Mar'20 - Aug'20

- Coordinated in a team of **8**, to build a real-time system that monitors network traffic for malicious activity
- Applied Chi-square test, Pearson Correlation on **CICIDS2017** dataset to select best 15 out of 81 features
- Trained classifiers like Neural Networks, Random Forest and ExtraTrees on over **2 million** data points
- Deployed an ExtraTrees model of **99.7%** accuracy with a raw network packet sniffer written in Python

AUDIO SUPER RESOLUTION

Course Project

Guide: Prof. VM Gadre | Digital Signal Processing

Dec'20

- Built a model for improving the resolution of audio samples from their initial low-resolution versions.
- Implemented **AudioUNet** based on the UNet and auto-encoders architecture to perform the task
- Used the **VCTK** (Voice-Cloning Toolkit) dataset which contains 44 hours of recorded speeches.

REMOTE SENSING IMAGE CLASSIFICATION

Kaggle Competition

Guide: Prof. Biplab Banerjee | Machine Learning for Remote Sensing

Sept'19

- Developed an **image classifier** to classify remote sensor images captured by satellites into different classes
- Trained and tested various models like **Inception v3**, **GoogleNet**, etc to maximise prediction accuracy
- Achieved test accuracy of **97.5%** using **VGG-19 BN** network with **Adam** optimizer and **NLL** loss

Robotics & Other Projects

STUDENT DESIGN CHALLENGE

American Society of Mechanical Engineers

Overall **winners** in Asia-Pacific Regionals out of 22 teams from all over Asia

Nov'18-Feb'19

- Qualified for **World Finals** which was held at Utah, USA; by virtue of performance in regional level
- Coordinated a **team of 11** to develop a remote controlled bot capable of picking, storing and placing
- Designed the circuit boards required, in **EAGLE** Circuit simulator & modeled wire routing in **Solidworks**
- Integrated **Roboteq** with **Arduino UNO** for controlling stepper and Encoder Geared DC Motors

IMAGE DEBLURRING USING REVERSE HEAT EQUATION

Course Project

Guide: Prof. Suyash Awate | Digital Image Processing

Dec'20

- Implemented an algorithm to solve the problem of **blurring** of image modeled in the form of heat equation
- Used **reverse heat** equation by stabilizing normal component of gradient, maintaining the overall form
- Added stopping criterion based on curvature of tangential component as reverse heat equation is divergent

BINARY-CODED DECIMAL MULTIPLIER

Course Project

Guide: Prof. Mahesh Patil | Introduction to Electronics

Mar'19-Apr'19

- Designed and constructed a circuit which takes two numbers as input through a **thumbwheel switch**
- These two numbers are multiplied by repeated addition and the output is displayed in binary format
- Used Adder with Fast Carry, D-Flip Flops, Synchronous 4-bit binary-up counters and logic gates
- Designed, optimized and simulated the whole circuit in **EAGLE** circuit simulator

BLUETOOTH CONTROLLED BOT

Institute Technical Council (ITC)

Institute freshmen bot building competition

Aug'18

- Built a **bluetooth controlled bot** using **HC-05** which manoeuvred using an Android App
- Used **ATtiny** and **L293D** to develop a differential steering mechanism and implemented it in a bot
- Designed the electrical circuit and optimised the bot to overcome various hurdles with minimum time

ML & Coding Projects and Workshops

- Developed an anomaly detection model based on **ensemble learning** using hard-voting of Random Forest and Decision Trees classifier, to detect presence of **thyroid** in patients, which achieved F1 score of **0.95** ['20]
- Built an attention based VGG-16 model to identify melanoma in lesion images for the **kaggle competition** "SIIM-ISIC Melanoma Classification" and achieved area under ROC curve score of 0.8007 ['20]
- Deployed an IBM Watson computer vision model on IBM cloud as a **web app** for classifying furnitures ['20]
- Built a simple **client-server** point-to-point chat application in python using **socket** programming ['20]
- Implemented the research paper 'Photoplethysmographic imaging of high spatial resolution' in Matlab ['20]
- Shortlisted in Ideation round of **INTEL Python-Hackfury2**, with theme being innovation in AI ['19]
- Critically reviewed research paper on Deep Learning Human Mind for Automated Visual Classification ['19]
- Participated and completed the **Web Development Bootcamp** organised by Career Cell, IIT Bombay ['19]
- Participated in Two-Days Techno-Entrepreneurship workshop on **Ethical Hacking** at IIT Bombay ['18]

Position of Responsibility

Coordinator

Innovation Cell

*Innovation Cell aims to facilitate technical start-ups and foster an atmosphere of **innovation*** Oct'18-Apr'20

- Member of the team in charge of **planning, organizing** and publicizing events under the Innovation Cell
- Interviewed and Recruited **9** freshmen and **12** sophomores from a pool of **300+** UG and PG applicants

XLR8 | Coordinator

Electronics and Robotics Club, ITC

Institute Freshmen bot building competition

August'19

- Part of 9 membered team to organize **XLR8** competition for freshmen to build a bluetooth controlled bot
- Mentored 500+ freshmen and helped them understand functions of various mechatronic aspects of bot

Technical Skills

Programming Languages	C/C++, Python, Solidity, ROS (Robot Operating System)
Machine Learning	<i>Python:</i> scikit-learn, keras, PyTorch, Tensorflow
Data Science/Visualization	<i>Python:</i> Numpy, Pandas, Seaborn, OpenCV
Software/Platforms	SolidWorks, AutoCAD, Arduino IDE, MATLAB, EAGLE, NGSPICE, \LaTeX

Key Courses Undertaken

Electrical Engineering	Network Theory, Electronic Devices and Circuits, Analog Circuits, Digital Circuits, Signals and Systems, Communication Systems, Microprocessors, Digital Signal Processing
Computer Science	Machine Learning for Remote Sensing-I & II, Computer Programming and Utilization, Data Structures and Algorithms, Fundamentals of Digital Image Processing, Logic for Computer Science
Mathematics & Statistics	Linear Algebra, Calculus, Differential Equations, Complex Analysis, Data Analysis and Interpretation, Probability and Random Processes
Coursera	AI for Medical Diagnosis, TensorFlow in Practice (Specialization)

Extra-Curricular

- Attended the **VIJYOSHI** - National Science Camp organised at **IISc, Bangalore**
- Completed a year-long course in **National Cadet Corps** in the Maharashtra Regiment
- Volunteered for Career Counselling Campaign conducted in 60+ BMC schools
- Volunteered in the Half Marathon conducted by AAVHAN, IIT Bombay with 4000+ participants
- Awarded merit certificate for winning the **football** tournament in the Annual Training Camp of NCC

References

- **Prof. Biplab Banerjee**
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