S Divakar Bhat | **18307R004**
Electrical Engineering | **M.Tech.**
Indian Institute of Technology, Bombay | **Gender: Male**
Specialization: Control and Computing | **DOB: 16-03-1996**

Examination	University	Institute	Year	CPI / %
Post Graduation	IIT Bombay	IIT Bombay	2021	9.15
Graduation	CUSAT	Model Engineering College	2017	8.76
Graduation Specialization: Electrical and Electronics Engineering				
Intermediate	CBSE	Kendriya Vidyalaya Kadavanthra	2013	93.20%
Matriculation	CBSE	Kendriya Vidyalaya Kadavanthra	2011	10

AREAS OF INTEREST

Deep Learning, Machine Learning, Computer Vision, Image Processing

RELEVANT COURSES

- Machine Learning for Remote Sensing I & II
- Optimal Control Systems
- Applied Linear Algebra
- Matrix Computations
- Statistical Signal Analysis
- Image Processing

MAJOR PROJECTS AND SEMINAR

- **M.Tech Thesis**
  Title: Lifelong Learning in Visual Recognition
  Guide: *Prof. Subhasis Chaudhuri, Department of Electrical Engineering, IIT Bombay* [*Jun '20 - Present*]
  Co-Guide: *Prof. Biplab Banerjee, CSRE, IIT Bombay*
  Keywords: *Incremental Learning, Meta learning, Classification*
  - Studied various techniques and approaches used in mitigating catastrophic forgetting using **meta-learning**
  - Exploring implementation of **continual** meta-learning via graph based and targeted probabilistic approaches
  - Future work: Explore incremental meta-learning using **probabilistic** techniques and **reinforcement learning**

- **Curriculum-driven Incremental learning Network for Remote Sensing Image Classification**
  Guide: *Prof. Subhasis Chaudhuri, Department of Electrical Engineering, IIT Bombay* [*May '19 - May '20*]
  Co-Guide: *Prof. Biplab Banerjee, CSRE, IIT Bombay*
  - A **faster** and **better performing** continual learning technique for remote sensing image classification
  - Approach utilised **curriculum learning** technique to speed up the training time and improve performance
  - Achieved about **19% margin** above the closest performing existing algorithm on NWPU-RESISC45 dataset
  - Observed that proposed curriculum based approach trained **two times faster** than the baseline algorithm

- **Directed Variational Cross-encoder Network for Few-shot Multi-image Co-segmentation**
  Guide: *Prof. Subhasis Chaudhuri, Department of Electrical Engineering, IIT Bombay* [*May '19 - Jan '20*]
  - Designed a novel framework for **multi image co-segmentation** using few-shot and variational inference
  - Solved the issue of **small sample problem** in co-segmentation using a modified few-shot learning approach
  - Achieved a margin of about **5% Jaccard index** over existing state of the art techniques on iCoseg dataset

- **M.Tech Seminar**
  Title: Incremental Learning
  Guide: *Prof. Subhasis Chaudhuri, Department of Electrical Engineering, IIT Bombay* [*Nov '19*]
  - Explored in detail multiple existing algorithms for mitigating catastrophic forgetting in continual learning
  - Proposed a curriculum learning based approach for continual learning with faster convergence time

PUBLICATIONS

- **S Divakar Bhat**, Biplab Banerjee, Subhasis Chaudhuri, Avik Bhattacharya, "CIRES-NET: Curriculum-driven Incremental learning Network for Remote Sensing Image Classification", (Under Review at *Pattern Recognition*)

COURSE PROJECTS

- **Comparison of Image Segmentation strategies from Classical to Deep Learning**
  Machine Learning for Remote Sensing I | *Prof. Biplab Banerjee* [Jan'19 - Apr'19]
  - Performed detailed analysis of **image segmentation** techniques used in classical & deep learning approaches
  - Trained and compared the results of segmentation using Graph Clustering, SVM and using U-Net based CNN

- **Incremental Learning through meta-learning strategies**
  Machine Learning for Remote Sensing II | *Prof. Biplab Banerjee* [Aug'19 - Nov'19]
  - Performed a detailed literature survey on the existing Incremental learning and meta-learning techniques
  - Implemented incremental learning framework and performed ablation on size of retained exemplar samples
  - Proposed to implement incremental learning using meta-learning, robust to the size of exemplar samples

- **Implementation of Scale Invariant Feature Transform (SIFT) for Image Stitching**
  Digital Image processing | *Prof. Amit Sethi* [Aug'18 - Nov'18]
  o Implemented *Scale Invariant Feature Transform* in **Python** from scratch
  o Implemented **Image stitching** algorithm using Scale Invariant Feature Transform

- **Designing Linear Controller for balancing of a Rotary Inverted Pendulum**
  Control & Computing Lab | *Prof. Dwaipayan Mukherjee* [Jul'19 - Nov'19]
  o Designed a **Linear Quadratic Regulating (LQR)** controller to balance the inverted pendulum
  o Achieved the design requirements of motor angle variations $\leq$ **30**° and pendulum angle variations $\leq$ **3**°.

- **Position Control of DC Motor**
  Control & Computing Lab | *Prof. Dwaipayan Mukherjee* [Jul'19 - Nov'19]
  o Implemented a **PID feedback controller** for DC motor position control using Arduino Mega
  o Achieved a rise time $\leq$ **0.5** sec, settling time $\leq$ **1** sec and percentage overshoot $\leq$ **5**% for a step input of 180°

- **Control of Line Following Robot (SPARK-V)**
  Control & Computing Lab | *Prof. Dwaipayan Mukherjee* [Jul'19 - Nov'19]
  o Implemented a **Gain Scheduling PID Feedback Controller** for controlling the dynamics of Spark-V robot to complete the black-lined track within **30 sec**

TECHNICAL SKILLS

- **Programming Skills:**
  o Programming Language : Python, MATLAB, C++, Bash | o Libraries : PyTorch, NumPy, Pandas

- **Software Tools:** LaTeX, Vim, Joomla, Bootstrap, Git | **Hardware:** Arduino

ACHIEVEMENTS

- Secured **99.3 percentile** in Electrical Engineering **GATE-2018** examination out of **1,21,383 candidates**
- Won Bronze in Football **PG General Championship** 2019-20 representing EE Dept. in a total of 21 teams
- Spearheaded a team that provided **electricity for 20 tribal houses** in Uriyampetty, Kochi, Kerala.

POSITIONS OF RESPONSIBILITY

- **Research Assistant (RA) at Vision and Image Processing Laboratory, EE, IITB** [*Jul '18 - Present*]
  o Performing research in the area of Vision and Deep Learning in collaboration with research scholars

- **RA for the DST project: India-Trento Program For Advanced Research Phase-IV** [*Jul '18 - Present*]
  o Working on Analysis of optical and Radar remote sensing images for dynamic earth-process monitoring

- **Teaching Assistant for GNR 638 in Autumn 2020** [*Aug '20 - Present*]
  o Mentoring and assessing students of the course GNR 638: Machine Learning for Remote Sensing II

- **Web Admin, Vision and Image Processing Laboratory, EE, IITB** [*Aug '18 - Present*]
  o Designing of the website for the Vision and Image Processing laboratory using the Bootstrap framework
  o Responsible for updating and maintaining the lab website

- **Web Design, C-MInDS, IITB** [*Apr '20 - Jun '20*]
  o Designed the website of Centre for Machine Intelligence and Data Science, IITB using Joomla framework

- **Chairman, Electrical Minds Forum, MEC, Kochi** [*Dec '15 - Apr '17*]
  o Responsible for conducting technical projects and activities under the Electrical Engineering Department

- **Joint Secretary, Executive Committee member, EXCEL 2016, MEC, Kochi** [*Dec '15 - Dec '16*]
  o Supervised several departments of the EXCEL 2016 Team as a member of the Executive Committee

HOBBIES AND INTERESTS

- Enjoys reading fiction and non-fiction books and targets to read at least around 52 books a year.
- Drawing portraits of random people and experimenting in combining different mediums.
- Listening to Music specifically carnatic fusion, classical, rock and pop; Trained in carnatic music.
- Relish running as a hobby and stress reliever with an aim to improve timing and reach a 8 mph pace.
- Especially fond of the refreshing Monsoon trekking experience in the beautiful western ghats.
- Plays football as a hobby and enjoys the spirit of camaraderie and team building of the sport.