Mohit Agarwala | **19307R004**
Electrical Engineering | **M.Tech.**
Indian Institute of Technology, Bombay | **Gender: Male**
Specialization: Communications Engineering | **DOB: 04-11-1996**

Examination	University	Institute	Year	CPI / %
Post Graduation	IIT Bombay	IIT Bombay	2022	7.81
Graduation	MAKAUT	Heritage Institute of Technology	2018	7.85
Graduation Specialization: Electronics and Communication Engineering				
Intermediate	CBSE	D.A.V Public School	2014	86.80%
Matriculation	ICSE	Splendour High School	2012	89.28%

AREAS OF INTEREST

• Wireless Communication • Machine Learning • Deep Learning in Image & Speech Processing

PUBLICATION

IEEE | ONLINE PARTIAL SERVICE HOSTING AT THE EDGE ***ICCCN 2021, Greece***
V S Ch Lakshmi Narayana, ***Mohit Agarwala****, Nikhil Karamchandani, Sharayu Moharir*

- Key novelty of this work is that we allow **Partial hosting** which enables fraction of the query to be served.
- Proposed a **Dynamic policy α-Retro Renting** and provided its performance guarantees at the edge server.
- Conducted extensive **Monte-Carlo** & **trace driven simulations** to demonstrate the performance of α-RR.
- Found several parameter regimes where α-RR's ability to store partially **greatly improves cost-efficiency**.

MAJOR PROJECTS AND SEMINARS

- **On the Latency & QoS in Haptics simulation using Video Streaming over Wi-Fi**
  Guide: Prof. Nikhil Karamchandani, EE Dept., IIT Bombay | M.Tech Project *(March 2021 - Present)*
  - **Objective:** To develop algorithm for remote control and rendering of graphics for high bandwidth application.
  - Built a **reliable UDP** Protocol for Multi-media applications in `C++` from scratch.
  - Studied Operator/Tele-Operator based **Haptics** application to perform remote based pottery making.
  - Measured **one way packet-wise** latency in a congested environment using **time synchronization** via **Marzullo's Intersection Algorithm**.
  - Studied the cause of packet drop in low reliable UDP protocols with **Wireshark**.
  - Implemented **Packet marking** for priority access to a certain type of traffic for ultra fast transmission.
- **High Throughput, Ultra-low latency Multimedia over Wi-Fi**
  Guide: Prof. Nikhil Karamchandani, EE Dept., IIT Bombay | M.Tech Seminar *(July 2020 - Dec 2020)*
  - Studied the effect of **prioritizing traffic** in latest **IEEE 802.11ax** wifi, while maintaining **fairness** and **QoS**.
  - Studied practical design choices including the **optimal configuration** of the scanning process during handoffs and the codec parameters for **delay optimization**.
  - Explored the use of Wi-Fi (IEEE 802.11n/r) network for remote control of a vehicle using **video transmission** on the uplink and **control signals** for the actuator on the downlink.
- **Geolife Trajectory Data Analysis for content caching**
  Guide: Prof. Nikhil Karamchandani, EE Dept., IIT Bombay | Research Project *(May 2020 - Dec 2020)*
  - Developed tools for map simulation from **Taxi GPS data** of Beijing City.
  - Used **Dijkstra's** and **Fractional Knapsack** algorithm for content caching with maximum benefit path first.

KEY ACADEMIC PROJECTS

- **Speech to Sign-Language(with emotions) for the Hearing-Impaired**
  Guide: Prof. Preeti Jyothi, CSE Dept., IIT Bombay | Automatic Speech Recognition *(Jan 2021 - Jun 2021)*
  - **Objective:** To classify the text data into either a positive or a negative sentiment.
  - Trained various neural networks LSTM, GRU, Bi-LSTM and Bi-GRU on IMDB Dataset, and studied the evolution of their performance on changing the number of units and layers.
  - Studied the effects of using different learning-rate schedulers like Cosine Annealing scheduler, Exponential rate scheduler, Step scheduler and Reduce Learning Rate on Plateau scheduler.
  - Achieved an accuracy of **87%** using BiGRU model and around **86%** accuracy using LSTM model with Reduce Learning Rate on Plateau Scheduler.
- **Flash No-Flash Photography**
  Guide: Prof. Suyash P.Awate, CS Dept., IIT Bombay | Digital Image Processing *(Aug 2020 - Dec 2020)*
  - Implemented denoising and detail transfer to merge the ambient qualities of the no-flash image with the high-frequency flash detail, using cross-bilateral filtering.
  - Performed white-balancing to change the color tone of ambient images, continuous flash to interactively adjust flash intensity, and red-eye removal to repair artifacts in the flash image.

- **Facial Emotion Recognition using Deep Learning**
  Guide: Prof. Preeti Jyothi, CSE Dept., IIT Bombay | Automatic Speech Recognition *(Aug 2020 - Dec 2020)*
  - Synthesized phonemes by implementing source filter model to replicate the human glottal source.
  - Performed Linear Predictive Analysis of natural and synthetic speech which involved LP coefficient estimation, constructing LP magnitude spectrum and sound reconstruction.
- **Attrition Classification**
  - **Objective:** To predict whether an employee will leave the company or not based on 33 information points
  - Achieved accuracy of **88.47%** by training **SVM** (Support vector machine) classifier on **Kaggle dataset.**
  - Extracted relevant and less correlated features and applied One-Hot Encoding for features with multi-classes.
- **Support Vector Machine**
  - **Objective:** Implement the modified SVM algorithm in the paper titled **Pegasos**: **P**rimal **E**stimated sub-**G**r**A**dient**SO**lver for SVM using `NumPy`.
  - Use SVM classifier on linear data and kernelized-SVM on non-linear data.
- **Routing Information Protocol (RIP) using `C`** | Communication Networks *(Jan 2020 - Apr 2020)*
  - **Objective:** To implement RIP using socket programming (in `Linux`).
  - Implemented RIP (Distributed Bellman Ford Algorithm) using `C` socket programming that read a given network topology and generated the cost matrix for the shortest paths between the nodes.

TECHNICAL SKILLS

- **Programming Languages :** `C`, `C++`, Python, HTML | **Operating Systems:** Windows, Linux
- **Tools and Software :** MATLAB/GNU Octave, TensorFlow, PyTorch, Pandas, NumPy, GNU Radio.

POSITIONS OF RESPONSIBILITY

- **Institute Interview Coordinator** | Institute Placement Team, IIT Bombay *(Nov 2019 - Dec 2019)*
  - Coordinated with a team of 250+ members for interviews of **1600+ students**.
  - Assisted in conducting Pre-Placement Talks, Placement Tests and Interviews for **15+ firms**.
- **Mess Councillor** | Hostel Affairs Team, IIT Bombay *(July 2019 - April 2020)*
  - **Supervised, coordinated** & **managed** the planning & execution of food needs for **600+** hostel students.
  - Ensured **quality meals** at **minimum cost**, utmost hygiene with **zero-waste** management system.
  - **Organized** & participated in various **cultural**, **technical** and **sport** events for Hostel-4 IIT Bombay.

RELEVANT COURSES

• Statistical Signal Analysis	• Digital Image Processing	• Optimization & Real Analysis
• Fundamentals of Machine Learning	• Automatic Speech Recognition	• DSP & its applications
• Digital Message Transmission	• Wireless & Mobile Communication	• Communication Networks

EXTRA CURRICULAR ACTIVITIES

- Received **Special Mention Award**, Hostel-4 Organization 2020 for my work as a part of Hostel Affairs Team.
- Won **Gem of the General Championship** (MDGC-2019) for Hostel-4, IIT Bombay as part of Dramatics team.
- **Interests and Hobbies**: Cricket, Badminton, Table tennis, Listening to music.