Mohit Agarwala

Bengaluru, India 560076
(+91) 9981763633, 9564241151
✉ mohit.496.ece@gmail.com
My webpage
Github: mohit-iitb

Research Engineer (Deep Learning & Algorithms), IIT Bombay (M.Tech)

Areas of Interest

Machine Learning, Optimization, Deep Learning in Image & Speech Processing, 3D Computer Vision, Multimodal Learning, Robotics, Computer Vision - Perception, Reinforcement Learning, SLAM / Localization, Generative AI

Work Experience (2019 - Present)

May 2024 – Present

Research Engineer - Computer Vision in Robotics, Krutrim AI.

Complete Autonomous Dark Store for Instant Grocery Order Delivery, ONDC Platform.

- Developing and integrating SOTA Deep learning based vision techniques for precise object detection and localization using an RGBD camera sensor, using segmentation and depth information
- Enabling accurate and optimized real-time pick-and-place operations by synchronizing vision data with robotic hand movements
- Collaborating with robotics engineers and software developers to integrate the vision system into the autonomous dark store's architecture

Jul 2022 – Apr 2024

Research Engineer (Deep Learning) - *Computer Vision & Algorithms*, OLA ELECTRIC.

*Core member of **Algorithms, Software & Systems Team** at OLA Electric Autonomous Vehicle R&D*

- Contributed in development and maturity of L0 - L2+ ADAS production ready features using Object Detection & Tracking, Lane Segmentation and other tasks for Perception module of Self Driving Vehicles
- Worked on Carla Simulator for Synthetic Data Generation and training/testing features for bench setup
- Involved in end-to-end approach for BEV Generation and Waypoint prediction on NuScenes Dataset
- Optimized deep learning models for deployment on edge (Jetson Nano) using Tensor RT
- Helped setting up auto-pipeline for faster annotation of millions of in-house collected sensor data

Bird's Eye View generation using transformer based deep learning model, Self Driving Cars.

- Developed a transformer-based deep learning model for BEV generation, incorporating advanced architectures from literature such as FastBEV and BEVFormer
- Designed and implemented a multi-view fusion approach to integrate high-resolution camera and Lidar data, enhancing spatial and depth perception
- Conducted extensive literature surveys to stay updated with the latest advancements in BEV generation
- Trained the model on large-scale datasets to improve BEV representation accuracy, utilizing data augmentation and pre-processing techniques for optimal performance
- Optimized model performance for real-time processing, achieving low-latency outputs suitable for dynamic driving environments

Forward collision warning for ADAS, Two-wheeler project.

- Depth Estimation using IPV for Vehicle Detection in ADAS
- Estimating 2D projection of 3D bounding box from 2D bounding box and geometry constraints
- Implemented logic and managed test cases for robust algorithm design
- FCW Finetuning - Finetuning ROI estimation (PoC development) Task : RoI generation for 2 Wheeler in Indian Road conditions based on current velocity of the vehicle

Factory Automation : Battery line Vision, Assembly production line.

- Developed and deployed an image processing model to detect and predict the alignment of battery cell cavities, preventing cells from falling out during module insertion
- Collected data to implement a robust deep learning model for detection in varied and unpredictable conditions

Radar-Camera Fusion Using Point Cloud Representation, Self-Driving Cars.

- Motivation:Leverage CenterFusion approach for radar and camera integration to enhance 3D object detection in autonomous driving.
- Methodology: Radar camera feature level fusion by using point cloud representation of radar on Nuscenes dataset.
  - Utilized a novel frustum-based method to associate radar detections with object centers detected in images.
  - Combined radar-based feature maps with image features for improved depth, rotation, and velocity estimation of objects.

Jul 2019– Jun 2022	**Graduate Research Assistant (Deep Learning) -** ***Stochastic Systems Lab***, IIT Bombay. *Government Sponsored Projects: Papers published*

Dailizing & clustering of Non-daily Trains using Machine Learning, Indian Railways.

Developed algorithm for optimized weekly scheduling of trains in GQD network using unsupervised methods
- Resolved train reversals and misdirection classifications from the SATSANG data
- Clustering & visualization of trains in GQD using representation learning methods e.g, t-SNE, PCA
- Identified under-utilized paths for further processing to increase throughput of the Indian Railway Network

Geolife Trajectory & Google Cluster Data Analysis for Content Caching Algorithm, Stochastic Systems Lab, Graduate Research Assistant, IIT Bombay.
- Proposed a Dynamic Policy, α-Retro Renting, and provided its performance guarantees at the Edge Server
- Developed tools for pre-processing and map simulation from 180+ GPS Taxi Data of Beijing City
- Implemented K-means clustering using Voronoi tessellation to the original city map
- Found several regimes where α-RR greatly improves cost-efficiency and, in the worst case, it is 6-optimal

On Latency & QoS in AR/VR Simulation using Video Streaming over Wi-Fi, Stochastic Systems Lab, Graduate Research Assistant, IIT Bombay (Master's Thesis).
- Studied Operator/Tele-Operator-Based Haptics application to perform low latency tasks in a wired medium
- Built a reliable UDP Protocol for Multi-media applications in C++/Python from scratch
- Measured one-way latency & implemented packet marking in a congested environment for priority access

Education

Year	Degree	Institute	GPA(10)/Marks(%)
2022	**M.Tech in Communication & Signal Processing**	**IIT Bombay**	**9.11**
2018	B.Tech in Electronics & Communication	Heritage Institute of Technology, Kolkata	7.85
2014	Senior School	DAV Public School, Midnapur	86.80%
2012	High School	Splendour High School, Kharagpur	89.28%

Publications

WCTR '23 **M. Agarwala**, et al., "Clustering techniques to optimize railway daily path utilization for non-daily trains," 2023 World Conference on Transport Research, Accepted.

TOMPECS '22 V. S. C. L. Narayana, **M. Agarwala**, N. Karamchandani and S. Moharir, "On Renting Edge Resources for Partial Service Hosting," ACM Transactions on Modeling and Performance Evaluation of Computing Systems, Volume-9, Issue-1, Article No.: 2, pp:1–31, *https://doi.org/10.1145/3616866*.

ICCCN '21 V. S. C. L. Narayana, **M. Agarwala**, N. Karamchandani and S. Moharir, "Online Partial Service Hosting at the Edge," 2021 International Conference on Computer Communications and Networks (ICCCN), 2021, pp. 1-9, doi: 10.1109/ICCCN52240.2021.9522218.

Relevant Courses

Completed Foundations of Machine Learning, Automatic Speech Recognition, DSP & its Applications, Statistical Signal Analysis, Digital Image Processing, Optimization, Communication Networks, Real Analysis, Deep Learning in Natural Language Processing, AI Data & Policy

Technical Skills

Languages Python, C/C++, Matlab/GNU Octave

Frameworks Keras, PyTorch, Tensorflow, Pandas, MatplotLib, NumPy, Scikit-learn

Utilities Docker, Anaconda, Git, Vim, LaTeX, Jupyter Notebook, Carla | *Operating system* : Linux, Windows, ROS