

Education

2022 – 2026 **B.E. Computer Science**, *Birla Institute of Technology and Science, Pilani*, Goa, India

Publications

[IEEE Xplore] **The Last Mile: A Novel, HotSpot-Based Distributed Path-Sharing Network for Food Deliveries**, *IEEE Transactions on Intelligent Transportation Systems*

○ **Authors:** Ashman Mehra, **Divyanshu Singh**, Vaskar Raychoudhury, Archana Mathur, Snehanishu Saha

Experience

May 2025 – **CLAN Labs, Purdue University, West Lafayette, IN**, Research Intern

Present *Supervisor: Dr. Vaneet Aggarwal*

- Currently developing dynamic obstacle avoidance techniques using uncertainty-based adaptive planning with diffusion models.
- Exploring multi-modal applications of diffusion models in medical domains.

December 2023 – **APP Center for AI Research (APPCAIR), Goa, India**, Undergraduate Researcher

Present *Supervisors: Dr. Snehanishu Saha, Dr. Santonu Sarkar*

- Developed DeliverAI, a reinforcement learning-based model for optimizing food delivery routes.
- Investigating a novel dynamic ride-sharing system using a multi-agent actor-critic approach with enhancements to minimize detours and optimize rider pickups.
- Formulating a driver behavior modeling framework to quantify unruliness in traffic scenarios, with plans to adapt it for complex traffic conditions in India.

May 2024 – **Digital India Bhashini Division, India**, Research Intern

July 2024 *Contributed to the National Language Mission to advance language technologies for Indian languages*

- Collaborated with the post-processing team, focusing on Inverse Text Normalization (ITN).
- Designed a WFST-based model for ITN across diverse Indic languages, [Git].
- Implemented a T5-based model to enhance ITN by introducing punctuation handling.

Ongoing Projects

December 2024 – **Driver Behaviour Modeling, BITS Pilani, Goa**

Present *Generative AI, Computer Vision*

- Developing a transformer-based encoder-decoder model integrating kinematic data, vectorized maps, and vision-language outputs for real-time anomaly detection in traffic behavior.
- Designing a driver unruliness quantification framework, capturing risky maneuvers, violations, and aggressive driving patterns.

August 2024 – **Altruistic Ride Sharing, BITS Pilani, Goa**

Present *Deep Reinforcement Learning, Optimization*

- Developed an altruistic ride-sharing framework where drivers can pick up and drop off riders along their route while minimizing detours.
- Utilizing an Attention-based Multi-Agent Actor-Critic model with novel policy modifications to enhance co-operative decision-making, optimizing ride allocation while balancing altruism and efficiency in ride-sharing

March 2025 – **Graph Diffusion for RNA 3D Folding, BITS Pilani, Goa**

Present *Graph Neural Networks, Diffusion Models, Computational Biology*

- Developing a graph diffusion model to predict 3D structures of RNA molecules by leveraging graph neural networks and probabilistic sampling techniques.
- Exploring the integration of structural constraints and energy-based priors to enhance the accuracy of RNA folding predictions.
- Evaluating the model's performance on benchmark datasets, focusing on metrics like RMSD and structural fidelity to native conformations.

Completed Projects

- December 2023 – June 2024 **DeliverAI**, BITS Pilani, Goa
Reinforcement Learning, Optimization
- Proposed DeliverAI, a reinforcement learning-based path-sharing algorithm to optimize food delivery routes by reducing costs and improving efficiency.
 - Modeled the problem as a multi-objective optimization balancing consumer satisfaction and delivery costs.
 - Simulated DeliverAI on real-world Chicago delivery data, demonstrating a 15% reduction in fleet size, 16% reduction in distance traveled, and 50% increase in fleet utilization compared to traditional point-to-point delivery methods.
 - Published in *IEEE Transactions on Intelligent Transportation Systems*: [\[IEEE Xplore\]](#)
- April 2025 **LLMExam: AI-Driven Question Paper Generation**, BITS Pilani, Goa
NLP, Retrieval-Augmented Generation, Generative AI, Multimodal AI, Reinforcement Learning
- Built a multimodal pipeline using a local LLM (Qwen 2.5) for automated retrieval of textual questions, diagrams, and graphs from PDFs, leveraging vector search for topic-based extraction.
 - Implemented LLM-driven topic tagging with dynamic matching against a vector database for accurate question categorization.
 - Generated curated question papers in Markdown format based on user-defined topics and constraints, preserving textual and visual content.
 - Developing a Reinforcement Learning with Human Feedback (RLHF) framework to evaluate and improve topic tagging accuracy, difficulty assignment, and overall pipeline stability.
- November 2024 **Zero-Shot Classification with RoBERTa**, BITS Pilani, Goa, [\[Git\]](#)
NLP, Deep Learning, Generative AI
- Utilized a pre-trained RoBERTa model for zero-shot classification on the AG News dataset using Hugging Face transformers.
 - Optimized label prompts iteratively with generative LLMs (Gemma2-9B, Qwen2.5-32B, Nemotron-70B), boosting accuracy from 48.5% to 82.13% (achieved by Nemotron-70B).
 - Assessed performance using precision, recall, F1-score, and confusion matrices, analyzing common error patterns and label effectiveness.

Relevant Coursework

- CS Reinforcement Learning, Generative AI [\[Git\]](#), Natural Language Processing, Foundations of Data Science, Object-Oriented Programming, Data Structures and Algorithms, Database Systems, Design and Analysis of Algorithms, Discrete Structures in Computer Science, Logic in Computer Science, Theory of Computation
- Online DeepMind x UCL: Deep Learning Lectures, DeepMind x UCL: Reinforcement Learning Lectures, CS229 Stanford ML, CS50's Introduction to AI with Python [\[Certificate\]](#)

Technical Proficiency

- Languages Python, C++, C, Java, SQL, \LaTeX
- Tools PyTorch, TensorFlow, JAX, Hugging Face, Gymnasium, PettingZoo, Anaconda, GitHub, Docker
- Interests Reinforcement Learning, Generative AI, Deep Learning, Natural Language Processing, Optimization

Volunteer Experience

- January 2025 – May 2025 **Teaching Assistant, CS-F425 Deep Learning**, BITS Pilani, Goa, India
- Designed and conducted tutorials on deep learning concepts for undergraduate students.
- December 2024 **Undergraduate Volunteer, IndoML 2024**, Goa, India
- Represented APPCAIR as one of the few undergraduate volunteers, showcased research at the sponsor stall, and facilitated Q&A sessions during the conference.