

# Anshul Singh

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## Education

June 2025 | **Panjab University** | Chandigarh, India  
Sep 2021 | Bachelor of Engineering in Information Technology  
CGPA: 9.17/10.00 (Rank: 03/119)

## Experience

Present | **IACV Lab, IISc Bangalore**  | Bangalore, India  
Aug 2025 | *Research Associate* | Advisor: Prof. Soma Biswas  
Working on a data-efficient active learning framework for multimodal fake news detection using a hybrid method based on entropy-based uncertainty and LLM-guided disagreements. Currently working on adversarial robustness of MLLMs and Diffusion models via activation steering.

June 2025 | **LT Research Group, University of Hamburg**  | Hamburg, Germany  
Jan 2025 | *Research Intern* | Advisor: Prof. Chris Biemann  
Worked on vision-language models for multi-tabular reasoning. Implemented post-training techniques like GRPO to handle multiple table images for multi-hop reasoning. Created the MTabVQA benchmark to evaluate VLMs and built a synthetic QA generation pipeline producing the MTabVQA Instruct dataset.

Sep 2024 | **Dalhousie University** | Nova Scotia, Canada  
June 2024 | *Visiting Research Intern (MITACS)* | Advisor: Prof. Ghader Manafiazar  
Analyzed animal vocalizations to predict calving time and assess pre- and post-weaning behavior using MFCC spectrograms and hybrid ViT-ResNet models. Applied Attention-Guided CAM to identify key spectro-temporal features driving classifications, achieving 83% accuracy.

July 2023 | **Virtual Labs, IIT Roorkee** | Roorkee, India  
June 2023 | *Machine Learning Intern* | Advisor: Prof. R.S. Anand  
Designed a high-performance ML pipeline for fault detection in induction motors using advanced feature extraction and dimensionality reduction techniques. Developed analysis tools and visualization platforms that accelerated research, supporting three related publications.

May 2023 | **Panjab University** | Chandigarh, India  
Jan 2023 | *Undergraduate Research Assistant* | Advisor: Prof. Veenu Mangat  
Conducted comparative analysis of machine learning classifiers for network intrusion detection, evaluating statistical feature selection and genetic algorithms. Explored provenance-based detection approaches using graph neural networks to enhance detection accuracy.

## Publications

[\* = Equal Contribution]

- [2025] **MTabVQA: Evaluating Multi-Tabular Reasoning of Language Models in Visual Space** [PDF]  
A. Singh, C. Biemann, J. Strich  
*Findings of EMNLP, 2025* [EMNLP]
- [2025] **Lost in Translation and Noise: A Deep Dive into the Failure Modes of VLMs on Real-World Tables** [PDF]  
A. Singh, R. Chaudhary, G. Singh, and A. Kumar  
*EurIPS 2025 Workshop on AI for Tabular Data* [EurIPS-W (Oral)]
- [2025] **M4-RAG: A Massive-Scale Multilingual Multi-Cultural Multimodal RAG**  
D Anugraha, P. Irawan, A. Singh, ESA Lee, G. Winata  
*In submission, CVPR, 2025* [Under Review]
- [2023] **Comparative Analysis of State-of-the-Art Attack Detection Models** [PDF]  
P. Kumari, V. Mangat, and A. Singh  
*14th International Conference on Computing Communication and Networking Technologies* [ICCCNT]

## Selected Projects

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### Cross-lingual Embedding Alignment for Indic Languages

*Python, PyTorch, FastText, SciPy* [🔗]

- > Developed a cross-lingual (Hindi/English) word-level alignment pipeline using FastText embeddings trained on Wikipedia dumps.
- > Achieved a competitive Precision@1 score (0.3464 vs. 0.3513 for pre-trained models).
- > Implemented a generative adversarial training framework to enhance unsupervised alignment in low-resource Indic languages.

### Aurelius: LLM For APIs

*Python, PyTorch, Transformers, Peft, BitsandBytes* [🔗]

- > Fine-tuned suite of LLMs for API call generation, fine-tuned on LLaMA-7B and Mistral-7B with adapter-based techniques and quantization for efficient inference.
- > Built retrieval system using ColBERT's token-level embeddings for enhanced API generation accuracy.

### Metal-FL: Cross-Platform Federated Learning

*Python, Kafka, gRPC, Socket.IO, Protobuf, PyTorch* [🔗]

- > Developed decentralized federated learning architecture with Kafka and gRPC for real-time communication, utilizing Socket.IO and asynchronous programming for seamless client-server connections.
- > Designed cross-platform model aggregation mechanism integrating weight updates from multiple heterogeneous machine nodes for distributed ML training.

## Technical Skills

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<b>Languages</b>	Python, C++, Java, JavaScript, CUDA, SQL, HTML/CSS, LaTeX
<b>ML/DL Frameworks</b>	PyTorch, TensorFlow, vLLM, veRL, DSPy, LangChain, Ray, MLflow
<b>Cloud &amp; Infra</b>	AWS, Kubernetes, Docker, SLURM, PySpark
<b>Web &amp; Databases</b>	FastAPI, Streamlit, Node.js, MongoDB, MySQL, Pinecone

## Honours and Leadership Roles

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<b>MITACS Globalink Award</b>	Awarded CAD \$9,000 competitive research fellowship for summer research internship at Dalhousie University, Canada (2024).
<b>Co-founder &amp; Director</b>	Uniqus Edutech Solutions, startup incubated at RUSA Innovation Cell, Panjab University.
<b>ML/AI Lead</b>	Google Developer Students Club (GDSC), Panjab University. Led AI/ML initiatives and workshops.
<b>Executive Core Member</b>	IEEE Student Branch. Served as Content Writing Head & Webmaster.
<b>Workshop Instructor</b>	Conducted IEEE Workshop on Basics of Machine Learning for 100+ college students.
<b>Organizer</b>	IEEE National Conference of Women In Engineering, PEC Chandigarh (2022).