# Aman Verma

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## Education

**Indian Institute of Technology Bombay** *2022 - 2027*
Dual Degree (B.Tech + M.Tech) in Electrical Engineering with Minor in Computer Science | GPA: **9.2/10**

- Secured **98.3 percentile** in JEE Advanced (150K+ candidates) and **99.78 percentile** in JEE Main (1.1M+ candidates)

## Internships and Research Experience

**Texas Instruments** | *Software Engineer Intern* | *Remote (Bangalore)* *May 2025 - Jul 2025*

- Engineered **Docker-based SDK build systems** with cross-platform installer pipelines for Windows/Linux/macOS, achieving **reproducible builds** across local development and CI environments through optimized dynamic prompts
- Integrated **AI-powered PR Reviewer Bot** in Bitbucket with inline suggestions, error-severity classification, and Klocwork static analysis, coupled with Jenkins end-to-end automation for SDK build, validation, and deployment

**Domain Generalization, Model Calibration & Explainable AI** | *Prof. Amit Sethi* *Jul 2025 - Ongoing*

- Architected end-to-end pipelines for domain-generalized vision systems integrating **CLIP-based prompting**, **post-hoc calibration** (temperature scaling, isotonic regression, conformal prediction), and human-in-the-loop decision policies across multiple frameworks: SentinelCLIP, DeMUX, xai-subtask-pipeline
- Developed explainability mechanisms including **question-based semantic probes**, GPT-assisted disentanglement of domain-invariant vs domain-specific rationales, and adaptive confidence thresholds for safety-critical scenarios

**PhnyX Lab** | *AI Intern* | *Backed by SK Networks, Palo Alto* *Jun 2024 - Jul 2024*

- Generated evaluations for **30 embedding models** on 18 NLU/NLI tasks using MTEB benchmark; added Korean tab to Huggingface leaderboard and studied fine-tuning for enterprise search with multilingual embedding models
- Fine-tuned Korean models on retrieval/reranking tasks using Ko-StrategyQA dataset on AWS by preparing complete data module, retrieval pipeline, and RAG-based domain-specific document processing

**Unmesh Mashruwala Innovation Cell (UMIC)** | *Perception Subsystem* *Sep 2023 - Present*
*Senior ML Engineer in team of 30+ building autonomous drones with Mahindra research collaboration*

- Implemented **BEV-Fusion** for Bird's Eye View generation using Waymo dataset, applying LSS transform for camera-to-BEV features and cross-attention between LIDAR and camera features for optimal fusion
- Developed robust architecture for **tiger detection** using ResNet-50 achieving **91.11% accuracy** and F1-score of 0.78 on ATRW dataset; deployed DL models on AWS and processed night vision camera images using classical algorithms

## Key Projects

**Multimodal Real-Time Anomaly Detection & Industrial Monitoring** | arXiv:2511.18698 *Nov 2025*

- Architected real-time multimodal monitoring system combining **hybrid object detection** (YOLOv8 + DETR), ByteTrack multi-object tracking, and multi-model audio ensemble (AST, Wav2Vec2, HuBERT) with learned fusion for robustness
- Implemented multi-method anomaly scoring stack (statistical z-score, convolutional autoencoder reconstruction, event classification) with weighted scoring, artifact archival, and Streamlit-based live UI

**AutoResearch Copilot: Multi-Agent RAG System** | *LLM-based Research Assistant* *Dec 2025*

- Built end-to-end AI research copilot using **Retrieval-Augmented Generation** with 5-agent LangGraph workflow (Planner, Retriever, Reasoner, Critic, Final Answer) enabling iterative research and verification
- Implemented production-grade FastAPI backend with **LlamaIndex + FAISS** for document indexing/retrieval, delivered full-stack system with Streamlit UI and Dockerized deployment with async APIs

**Field Ops Platform: Real-Time Operations System** | *Distributed Systems* *Ongoing*

- Designed real-time field-operations platform using **NestJS (Fastify)** with MongoDB for transactional workflows and Cassandra for high-throughput time-series operational data
- Built multi-surface clients across Angular (Web), React Native (Mobile), and Electron+React (Desktop) from shared TypeScript monorepo; deployed on Kubernetes using Helm and ArgoCD with OpenTelemetry observability

**Intro to Data Science** | *Course Project* | *Prof. Vinay Kulkarni, CMLDS* *Aug-Nov 2023*

- Analyzed solar plate data for anomaly detection using Multiple Linear Regression and predicted yield/hazard factors in chemical plant data using VIF-identified features
- Achieved top accuracy of **95.22%** among 80+ teams, earning special mention for analysis; introduced to big data tools like Apache Spark and Google Cloud Platform

## Technical Skills

- **Backend & Distributed Systems:** Node.js, Express, NestJS, Spring Boot, FastAPI, REST/GraphQL, Microservices, WebSockets, Event-driven Architecture, Kafka, Go, Java, C++, SQL, Bash, Linux, JavaScript, TypeScript
- **AI/ML Systems:** Deep Learning, Computer Vision, NLP, Multimodal AI, XAI, Uncertainty Quantification, PyTorch, TensorFlow, Scikit-Learn, Representation Learning, Python
- **Data Engineering & Cloud:** NumPy, Pandas, Apache Spark, ETL Pipelines, PostgreSQL, MongoDB, Cassandra, Redis, Docker, Kubernetes, Terraform, AWS, GCP