

VANSH BANSAL

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Education

BS in Data Science (Online) – Indian Institute of Technology, Madras

Expected: September 2027

Relevant Coursework: Software Engineering (SDLC), Software Testing & Quality, Modern App Dev, DBMS, DSA

B.Tech in Electrical Engineering – Punjab Engineering College, Chandigarh

Expected: May 2027

Skills

- **Programming Languages:** Python, Java, JavaScript, SQL,
- **Software Quality & Testing:** Unit Testing (JUnit, PyTest), TDD, SDLC, Code Reviews, API Design
- **Cloud & DevOps:** Google Cloud Platform (GCP), Google Workspace, AWS, Docker, Git, CI/CD
- **Databases:** PostgreSQL, MongoDB, Redis, SQLite
- **Web & Backend:** FastAPI, Flask, Celery, REST APIs, Next.js, React, WebSockets, Node.js
- **CS Fundamentals:** Data Structures & Algorithms, DBMS, System Design, Distributed Systems
- **AI/ML Platforms:** TensorFlow, PyTorch, CNNs, BiLSTMs, LangChain, RAG Pipelines, MLOps

Work Experience

Algorithmic Market Signal Platform [\[Link\]](#) – Python, Redis, Celery, Docker, Firebase, AWS **August 2025 – March 2026**
Independent Client Project

- Engineered scalable market intelligence using Python OOP models, processing live OHLCV data for **200+ symbols** across **8+ algorithmic pipelines**.
- Designed asynchronous Celery/Redis workflows for **sub-2s latency**, ensuring reliability via rigorous unit testing and automated AWS deployment.
- Implemented Cloudflare security and DDoS protection, delivering a **highly available production platform** for paying users.

Intern – Annam AI (IIT Ropar Collaboration) – Python, FastAPI, Next.js, GCP

June 2025 – July 2025

- Led API definition and implementation for a **multilingual AI chatbot** with context from personalized satellite data reports.
- Trained a **CNN model** for crop disease detection utilizing data aggregated and cleaned from 5 distinct sources.
- Automated satellite data report generation (Sentinel-2, Landsat-8) via **Google Earth Engine** on GCP.

Research Work

Delta-Based Target Reformulation for Electricity Load Forecasting [\[arXiv\]](#)

August 2025 – December 2025

- First author; proposed a delta-based forecasting formulation for electricity load prediction using **LSTM, Transformer, and LightGBM** models.
- Analyzed 8 years of hourly electricity demand data, enriched with diverse weather and calendar features.
- Achieved **2.55% MAPE** for hour-ahead forecasting, reducing error by **over 50%** versus absolute-load baselines.

Projects (15+)

AIGVS | Novel Vector Index for RAG Retrieval – Rust, PyO3, SIMD

June 2026 – July 2026

- Built a partitioned (non-graph) vector index with hierarchical routing and SIMD-quantized scanning, benchmarked against FAISS on **1M × 384-d** MSMARCO embeddings.
- Reached **0.9998 Recall@10** (vs. 0.9992 for FAISS-HNSW) with **32× faster** index build and **3.1× lower memory** versus HNSW; supports O(1) deletion (1.4 μs) via a lock-free segmented architecture.

Voice Emotion and Urgency Detection System – Python, TensorFlow, LangChain

May 2025 – June 2025

- Built a hybrid **CNN + BiLSTM** model classifying multi-speaker emotion across **6 distinct classes**, with 500+ background-sound recognition and speaker diarization.
- Made an end-to-end audio pipeline (Whisper transcription → urgency classification into 5 levels) using **LLMs via LangChain**.

Achievements & Leadership

- **Finalist:** Cyberthon.ai 2025 (Organized by Chandigarh Police in collaboration with Infosys and HDFC Bank)
- **Semifinalist:** Goldman Sachs India Hackathon 2025 (Quant Track)
- **Certifications:** Diploma in Programming (IIT Madras) | Diploma in Data Science (IIT Madras)
- **Executive Body Member – Entrepreneurship & Incubation Cell (PEC):** Organized 10+ campus workshops and secured 4th position pitching at IIT Bombay E-Summit.