

Pratyush Vishal

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Education

Vellore Institute of Technology, Vellore

Jul 2024 – Jul 2028

B.Tech in Electrical and Computer Science Engineering, CGPA: 8.49

Experience

Software Development Intern, Avior AI

Jun 2025 – Nov 2025

- Refactored a proof-of-concept microservice's PostgreSQL schema and API design, reducing request latency 2–2.5×.
- Modularized the React frontend and eliminated unnecessary re-renders to improve application performance.
- Built secure file storage and authentication features for a production service; redesigned the platform's landing page.

Research & Publications

First Author — Comparative Analysis of Deep Learning Algorithms for Rolling Element Bearing Fault Classification Under Variable Loads and Speeds

Scientific Reports (Nature Portfolio), 2026 — DOI: 10.1038/s41598-026-42592-y

- Published in 2nd year of undergraduate study**; built and evaluated a deep-learning pipeline for a **5-class, 45-condition** bearing-fault test rig, processing **18.9M+** raw vibration data points.
- Designed a **novel hybrid transfer-learning architecture**: frozen EfficientNetB0, MobileNetV2, and InceptionV3 backbones on CQ-NSGT spectrograms, feeding custom trainable residual blocks; validated the frozen-backbone choice against partial fine-tuning, which raised training cost 30–100% with no accuracy gain.
- Achieved **99.83% five-fold CV accuracy** (best of five evaluated architectures) and **98.8% accuracy at 1 dB SNR** under noise stress testing; gains confirmed statistically significant via Friedman test ($\chi^2(4) = 20.00$, $p = 0.0005$); **cited twice within 6 months** of publication.
- Benchmarked CNN vs. Vision Transformer approaches across training time, GFLOPS, latency, and memory footprint for deployment trade-off analysis.

Projects

FairGate — Fair-Share Event Ingestion Gateway

github.com/PratyushVishal11011/Fairgate

- Built a TCP ingestion gateway in Go with a token-bucket admission limiter and per-producer bounded queues scheduled via Deficit Round Robin (DRR) to enforce fair bandwidth sharing across producers.
- Designed a segmented write-ahead log with CRC32-checksummed records and group commit (batched `fsync` across concurrent writers); crash recovery replays segments in order and rejects torn records outside the final segment.
- Built a checkpointed shipper that streams durable WAL records to ClickHouse with retry/backoff and reclaims shipped segments; instrumented with Prometheus metrics and a Grafana dashboard, deployed via Docker Compose.

Luno — Research Management Platform

github.com/PratyushVishal11011/Luno-Backend

- Built a full-stack research-management platform (Next.js/React, FastAPI microservices) covering auth, project management, file uploads, references, notifications, and role-based dashboards for admin, faculty, and student roles.
- Architected the backend around an API Gateway, gRPC, and Kafka for inter-service messaging, with Redis caching and PostgreSQL storage; deployed via Docker Compose, Nginx/HTTPS, and JWT/RBAC on AWS EC2 for staging.
- Added analytics tracking across the platform to monitor usage and access patterns by role.

Patient Management System — Node.js/Express REST API

github.com/PratyushVishal11011/Patient-Management

- Built a REST API for clinic operations spanning authentication, appointments, doctor/patient management, and pharmacy/invoicing workflows, with Twilio-based OTP verification and Nodemailer for email.
- Designed a PostgreSQL/MongoDB dual-database architecture (Sequelize + Mongoose) with Redis and local in-memory caching; secured with JWT, bcrypt, Helmet, CORS, rate limiting, and compression.
- Containerized with Docker Compose; wrote Kubernetes and Azure deployment manifests.

Technical Skills

Languages: Python, JavaScript, TypeScript, Go, Java*, Kotlin*

AI / ML: PyTorch, TensorFlow, Scikit-Learn, NumPy, Pandas

Backend: FastAPI, Express.js, Flask, gRPC, Kafka, Redis

Frontend: React, Next.js, React Native, Expo

Cloud / DevOps: Docker, AWS

Databases: PostgreSQL, MongoDB, MySQL, ClickHouse

*Basic proficiency

Interests

Cricket, Badminton, Photography