Rahul Balachandar

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EDUCATION

Vellore Institute of Technology Chennai, India
Bachelor of Technology in Computer Science and Engineering (AIML Specialization)
CGPA: 8.65 Aug 2023 – May 2027(Expected)
Relevant Coursework: Data Structures and Algorithms, Operating Systems, Database Management Systems, Computer Networks, Object-Oriented Programming System, Software Engineering, Machine Learning, Deep Learning

TECHNICAL SKILLS

Programming: Java, Python, C++, SQL, TypeScript
Backend: Spring Boot (Security, Hibernate), Node.js, Express, FastAPI, REST APIs
Frontend: React.js, Vite, HTML/CSS
Databases: PostgreSQL, MongoDB
DevOps & Cloud: AWS (EC2), Docker, Git/GitHub Actions, CI/CD, Linux, Vercel, Render
Machine Learning: TensorFlow, PyTorch, Scikit-Learn, Pandas, NumPy

PROFESSIONAL EXPERIENCE

Machine Learning Intern May 2025 – June 2025
TANSAM Chennai, India

- Engineered a full-stack chlorine detection system for automated DPD water quality testing, deployed across Tamil Nadu public health facilities to process daily assessments and reduce manual testing time by 80%.
- Architected a two-stage ML pipeline combining YOLOv8 object detection for ROI localization and ResNet-50 CNN for multi-class classification (0-5 ppm), achieving 92% accuracy on 500+ real-world water samples.
- Built production-grade REST API using Flask, multipart file upload handling, and PIL-based image preprocessing and developed React.js frontend with real-time prediction visualization, and responsive design.

PROJECTS

ExpenseOps | Java, Spring Boot, PostgreSQL, React, Docker GitHub | Live Demo Jan 2026

- Built a multi-tenant SaaS expense system with JWT-based isolation across 20+ REST endpoints and a 5-state approval workflow using optimistic locking and transactional enforcement for safe concurrent updates.
- Implemented RBAC using Spring Security 6 with @PreAuthorize annotations, enforcing role-based access control across 4 user roles and securing sensitive operations like approval/rejection with method-level authorization.
- Optimized for 512MB cloud instances by tuning JVM heap and using multi-stage Alpine Docker builds, reducing image size by 40% (under 350MB).

LinkShelf | React, TypeScript, Node.js, Express.js, PostgreSQL GitHub | Live Demo Dec 2025

- Developed a bookmark management system using RESTful API with 3NF PostgreSQL schema, featuring GIN-indexed full-text search and IP-based rate limiting (500 req/15 min).
- Built an import engine for HTML/JSON file exports from up to 5 browsers with URL deduplication and robust per-item failure recovery.
- Implemented Open Graph metadata enrichment with timeout handling and optimistic UI updates in React for sub-100ms perceived latency.

MoodCast | FastAPI, React, Docker, Librosa GitHub | Live Demo Dec 2025

- Built a real-time music recommendation API using Librosa for audio feature extraction (22.05 kHz) and a stateless ML inference pipeline via FastAPI.
- Integrated Spotify Web API with weighted ranking and deduplication across 10 parallel search queries, increasing recommendation diversity by 60%.
- Engineered production-safe audio processing with try/finally cleanup and Docker-based deployment, preventing memory leaks during high-concurrency request handling.

CERTIFICATES AND ACHIEVEMENTS

Conference Presentation | IEEE ICERECT-2025: Paper on CNN-BiLSTM Attention Model Sept 2025

- Presented ”ENDCL: An Attention-Enhanced CNN-BiLSTM Model for Automated Cardiovascular Disease Detection”. Paper awaiting publication in IEEE journal.