

# Hamza Ali

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Software engineering student focused on backend development in Java and Spring Boot, with shipped projects covering RESTful APIs, event-driven microservices, and a RAG-based service. Leading the backend of a final year pronunciation training app and contributing merged pull requests to open source projects. Strong grounding in data structures, algorithms, and database design from completed coursework.

## Education

### B.E. Software Engineering

Mehran University of Engineering and Technology

August 2023 - October 2027 (expected)

Jamshoro, Sindh, Pakistan

CGPA: 3.28

**Coursework:** *Data Structures and Algorithms, Object-Oriented Programming, Database Systems, Operating Systems, Computer Networks, Discrete Structures, Formal Methods for Software Engineering, Data Science*

## Experience

### Back-End AI Engineering Intern

FlyRank AI

June 2026 - Present

Remote

- Built **CRUD REST services** with input validation and explicit status codes.
- Containerized an application with **Docker** so local setup and review environments stayed consistent.
- Diagnosed and fixed bugs in the existing codebase and worked through **Git-based code review** feedback.
- Completed a track assignment on token-based authentication: signup and login routes with **Supabase Auth**, **bearer-token middleware**, and Swagger UI.
- Worked on the track's **background-job pattern**: the endpoint answers 202 immediately, a worker runs the job, and a status endpoint reports the result.

### React Native Intern

Octaloo Technologies

May 2025 - July 2025

Islamabad, Pakistan (on-site)

- Developed the **Spring Boot backend** for Docspot, an appointment booking application, centralizing appointment data, authentication, and **MongoDB persistence**.
- Integrated **real-time calling** so users could communicate inside the application instead of switching to external tools.
- Verified **authentication behavior and data consistency** between the mobile client and the backend.
- Implemented React Native screens with API consumption and state management for user-facing workflows.

## Projects

### SpeakRight – English Pronunciation Training App

Final Year Project (in progress)

Team of three | backend and coordination lead

*Flutter, Spring Boot, Azure AI Speech (Pronunciation Assessment), PostgreSQL (Supabase), JPA, Flyway*

- Building a **Spring Boot backend** for a Flutter app that scores spoken English at word level and at **IPA phoneme level** using Azure's Pronunciation Assessment service.
- Designed the **PostgreSQL schema** with JPA and **Flyway migrations** for users, practice attempts, scores, and phoneme-level statistics.
- Implemented weakness tracking that keeps a **running incremental average** of per-user, per-phoneme accuracy and surfaces the three weakest phonemes against a 100-sentence corpus.
- Implemented adaptive practice selection with **UCB1**: the first 50 to 60 attempts follow weakness-based selection, then exploration ramps in so unpracticed sentences appear.
- Coordinate a **three-member team** (two developers, one UI/UX designer), assigning work across the backend, mobile app, and design.

### SofiCheck – RAG-Based FYP Similarity Checker

March 2026 - April 2026

*Java, Spring Boot, Spring AI, Qdrant, MongoDB, ONNX Embeddings, Groq, React, TypeScript, Vite, Azure VM, Vercel*

**Links:** [github.com/Hamza-ali1223/sofichack-frontend](https://github.com/Hamza-ali1223/sofichack-frontend) | [sofichack-frontend.vercel.app](https://sofichack-frontend.vercel.app)

- Built a **Spring Boot RAG service** that checks proposed final year project ideas against archived department catalogues using **semantic retrieval before LLM generation**.
- Implemented catalogue ingestion from PDFs into **Qdrant**, generating local **ONNX embeddings** for titles, abstracts, and metadata.
- Integrated Groq-hosted chat models through **Spring AI's OpenAI-compatible client** to return structured similarity ratings, similar historical projects, and explanations.

- Recorded request date, time, and token usage into **MongoDB** through a Spring AI advisor for request observability.
- Deployed the backend on an **Azure free trial VM** for 30 days, where it served **187 project-check requests with 200 OK responses** against an expected 50, because its users were one batch of students.
- Built the **React and TypeScript frontend** with backend health checks, draft autosave, browser-local query history, and parsed result cards, deployed on Vercel.

### PulseTrack Patient System

November 2025 - December 2025

*Java, Spring Boot, Microservices, Kafka, gRPC, Spring Security, JWT, Docker, PostgreSQL*

**Code:** [github.com/Hamza-ali1223/PulseTrack\\_Patient-Production-Backend](https://github.com/Hamza-ali1223/PulseTrack_Patient-Production-Backend)

- Designed a distributed healthcare backend where patient creation triggers **billing, analytics, and notification workflows** through event-driven communication.
- Separated core operations into independent **Spring Boot services** to improve fault isolation.
- Used **Kafka** for asynchronous downstream processing so patient events could be consumed without blocking user-facing API requests.
- Implemented **gRPC** for internal interactions that required explicit contracts and efficient service-to-service calls.
- Centralized authentication and request routing with **JWT-based security** at the system boundary.
- Containerized services with **Docker** and tested behavior under concurrent request patterns to find bottlenecks.

## Leadership and awards

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### AWS OctoFest Hackathon (Winner, Team Lead)

October 2025

- Led the **Lowkey Legends** team through the hackathon timeline, coordinating feature ownership and execution across contributors.
- Built a **Spring Boot backend with MySQL and Flyway migrations**, containerized using **Docker multi-stage builds and Docker Compose**, and delivered the final submission.

## Open source

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### OtterMind Chat2DB (open source database client)

PR #2179 | PR #2054 (merged)

- Fixed a persistence bug where saving a BigQuery datasource dropped its project, email, and keyfile fields; added them to the **DataSource entity and update request** (closes issue #2178).
- Wrote a source-verified **BigQuery connection guide** covering service-account setup, JDBC configuration, and troubleshooting.

### secure-backup

PR #18 (merged)

- Added a **secure passphrase generator** using `crypto.getRandomValues` and **clipboard copy** with a fallback for restricted webviews.

## Skills

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**Languages:** Java (Core Java, OOP, Streams API), JavaScript, TypeScript, SQL

**Concepts:** Data Structures and Algorithms, Database design, Microservices, Event-Driven Architecture, Apache Kafka (Spring Boot producers/consumers), Retrieval Augmented Generation, Database sharding (conceptual)

**Backend:** Spring Boot, Spring Security, JWT, Spring AI, Spring Data MongoDB, Hibernate ORM, Spring Data JPA, RESTful APIs, gRPC

**Testing:** JUnit 5, unit testing

**Databases:** PostgreSQL, MySQL, MongoDB, Qdrant

**DevOps:** Docker (multi-stage builds), Docker Compose, Cloud (Azure VMs), Flyway, Vercel

**Tools:** Git, GitHub, Swagger/OpenAPI, Postman, Maven, npm