

# AI CAREER MENTOR

*A Cross-Disciplinary Automated Career Guidance System*

A state-of-the-art solution for automated career transition across Tech and Non-Tech domains.

## APP DEVELOPMENT PROJECT REPORT

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## **Chapter 1: Introduction**

### **1.1 Background**

Career navigation is a complex, lifelong journey that fundamentally shapes an individual's professional identity and economic stability. In the rapidly evolving global economy, the traditional 'degree-to-career' pipeline is increasingly fractured. Technological advancements, shifting market demands, and the emergence of new vocational disciplines have made it difficult for job seekers to maintain a clear evolutionary path. Career counseling, once the domain of specialized human mentors, is now at a threshold of automation. Large Language Models (LLMs) like DeepSeek and Gemini provide the semantic reasoning required to understand complex professional narratives found in resumes. This project focuses on democratizing this mentorship by creating an AI Powered Career Mentor capable of guiding individuals through Tech, Business, Arts, and Healthcare sectors alike.

### **1.2 Problem Statement**

Contemporary job seekers face three critical barriers: 'Ambiguity', 'Fragmentation', and 'Inaccessibility'. Ambiguity arises when a user is unsure how their current skills translate into a specific target role. Fragmentation refers to the scattered nature of online learning resources, making it impossible to create a cohesive learning schedule. Inaccessibility highlights the high cost and low availability of professional human mentors. As a result, millions of talented individuals remain underemployed or stuck in career stagnation due to a lack of actionable, real-time guidance.

### **1.3 Objectives**

- To engineer a universal native Android application that serves as a 24/7 personal career coach.
- To implement a high-performance Python-based API for multi-disciplinary resume parsing.
- To utilize Generative AI for automated 'Gap Analysis' between user skills and market expectations.
- To design a system that generates dynamic, week-by-week learning curricula (Roadmaps) for any career goal.
- To ensure a seamless, high-fidelity user experience for both tech-savvy and non-technical users.

### **1.4 Scope**

The project scope encompasses a complete mobile-first solution including user lifecycle management, secure storage of professional profiles, automated semantic extraction from PDF resumes, and an intelligent recommendation engine. The system is designed to be cross-disciplinary, supporting a wide range of professional fields. It provides actionable outputs in the form of learning paths and real-time interactive counseling.

## **Chapter 2: Existing System & Proposed System**

### **2.1 Existing System**

The existing career guidance ecosystem is bifurcated into human mentorship centers and static job boards. Human-led centers offer deep context but are limited by working hours and geographical reach. Online platforms like LinkedIn or Indeed use keyword-based algorithms that effectively 'look backward' at what a user has done, but fail to 'look forward' at what a user \*needs\* to do to reach their next milestone.

### **2.2 Limitations of Existing System**

- Lack of Scalability: Human mentors cannot serve massive populations simultaneously.
- Prohibitive Costs: Professional coaching services are often unaffordable for students.
- Semantic Blindness: Keyword matching misses the underlying conceptual knowledge of a candidate.
- Passive Nature: Existing systems suggest jobs but do not help in building the skills for those jobs.

### **2.3 Proposed System**

The proposed AI Career Mentor transforms career guidance from a passive recommendation engine into an active development platform. By utilizing LLMs to read between the lines of a resume, the system identifies conceptual skill clusters. It then maps these against a target goal and generates a 'Bridging Curriculum'. This turns the app into a virtual Project Manager for the user's career.

### **2.4 Advantages**

The system offers 24/7 accessibility, complete objectivity, and hyper-personalized learning schedules. It reduces the time spent on career research by over 80%, allowing users to focus entirely on skill acquisition.

## **Chapter 3: System Analysis**

### **3.1 Functional Requirements**

F-01: User Registration & Secure Profile Management via JWT.

F-02: High-speed PDF Resume Upload and Text Extraction.

F-03: AI Driven Skill Mapping and GAP Analysis.

F-04: Personalized 8-16 Week Roadmap Generation.

F-05: Real-time Interactive AI Counselor for Career Advice.

F-06: Task Persistence and Progress Tracking.

### **3.2 Non-Functional Requirements**

- Performance: Response time for AI analysis should be under 20 seconds.
- Security: Secure hashing of all sensitive credentials (Bcrypt).
- Reliability: System must gracefully handle fallback between AI providers.
- Scalability: Backend architecture optimized for concurrent user requests.

3.3 Use Case Diagram

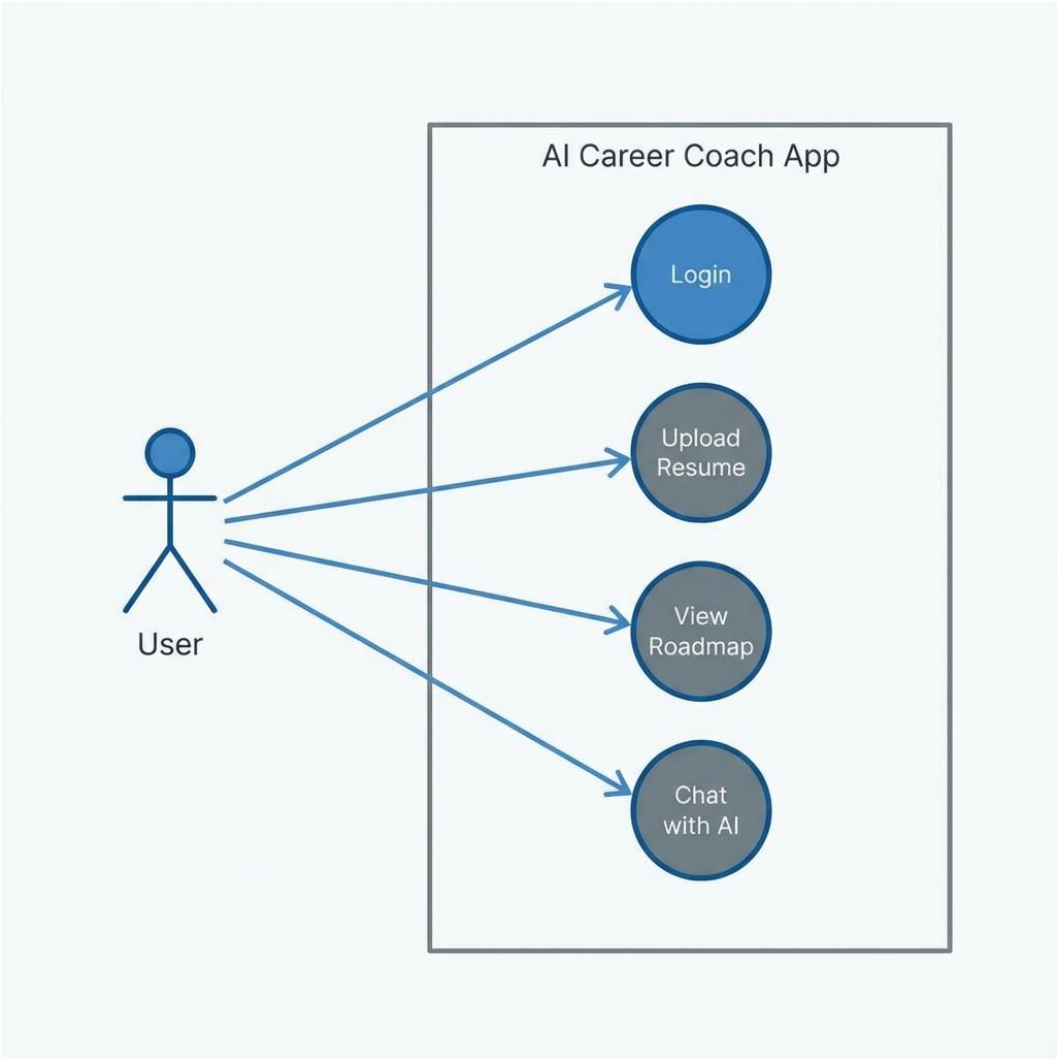


Figure 3.1: System Interaction Model

3.4 Use Case Descriptions

Use Case	Primary Actor	Description
Account Setup	User	User registers and sets career preferences
Resume Analysis	User/System	System parses PDF and extracted skills for gaps
Roadmap Generation	System	AI constructs a weekly learning curriculum
AI Mentoring	User	Interactive chat session for real-time guidance

## Chapter 4: System Design

### 4.1 System Architecture

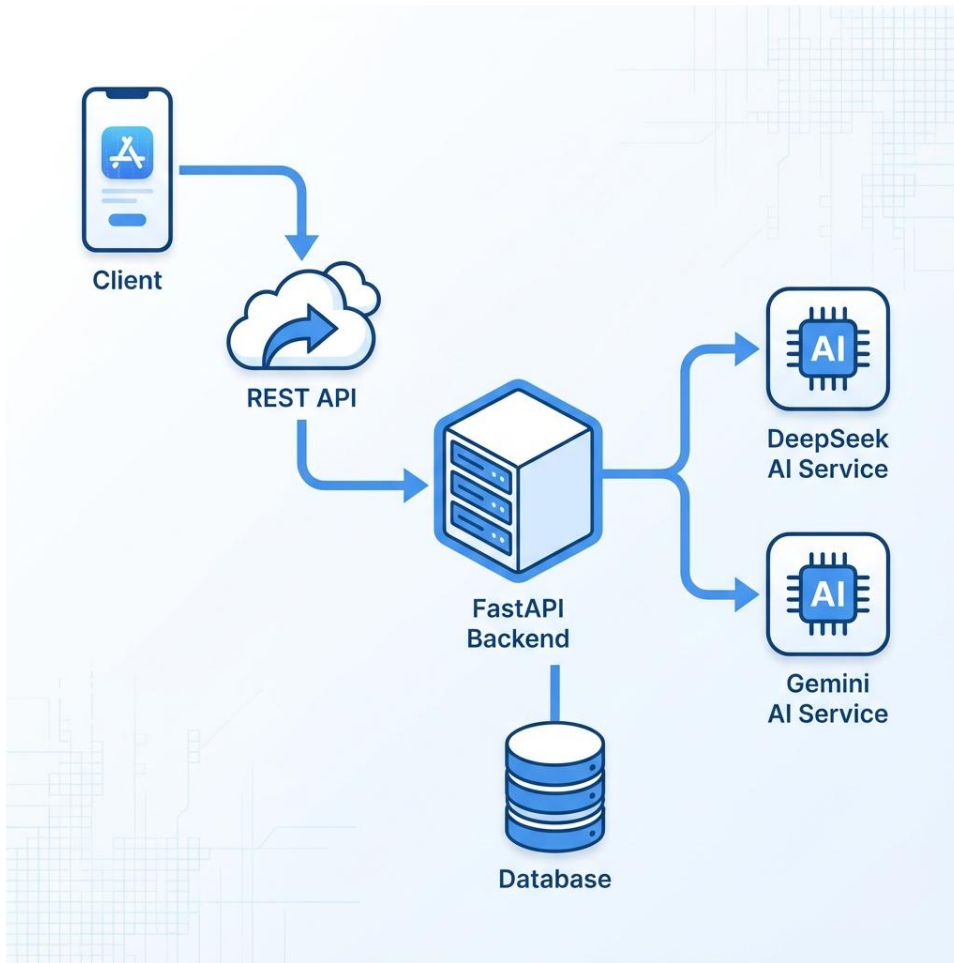


Figure 4.1: High-Level Architecture Flow

Our architecture follows a strictly decoupled layered approach. The Mobile Presentation layer (Android) communicates via an Interceptor-equipped Retrofit client to a RESTful FastAPI backend. The backend manages orchestrations between the relational DB (PostgreSQL) and the Intelligence Layer (DeepSeek/Gemini).

## 4.2 Database Design (ERD)

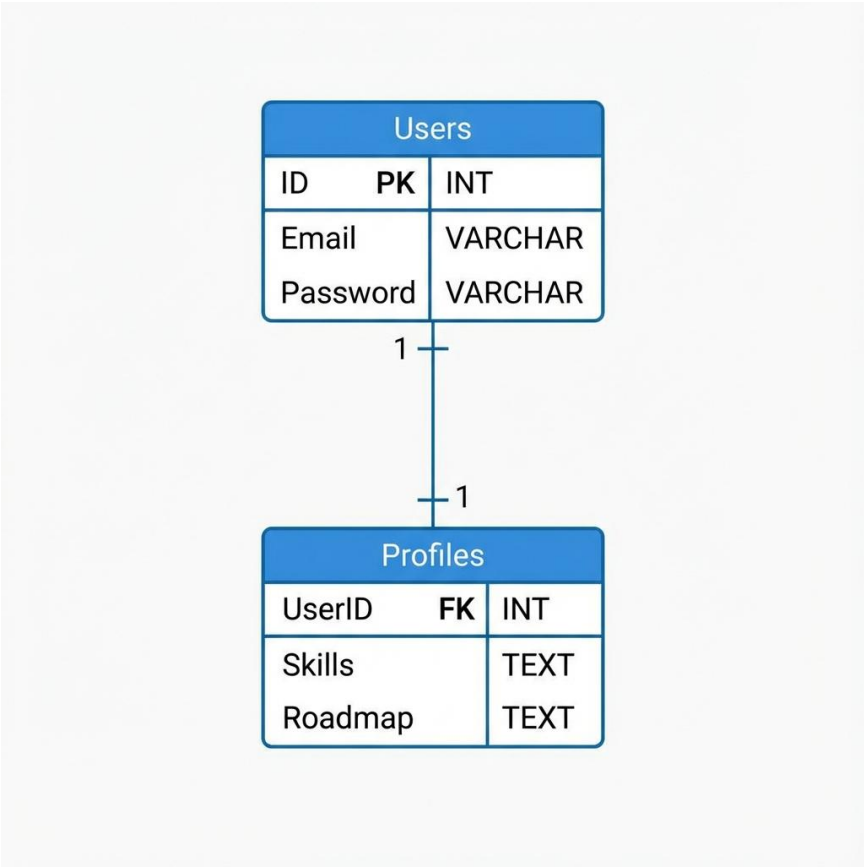


Figure 4.2: Entity Relationship Visualization

The schema is optimized for speed and data isolation. The User table handles authentication, while the Profile table stores serialized JSON blobs containing AI-generated roadmaps, ensuring that expensive AI computations are only performed when necessary.

## 4.3 API Design

Critical endpoints include `/auth/login` for session management, `/resume/analyze` for file ingestion, and `/ai/chat` for counselor interactions. Every request is validated using Pydantic models on the server side to ensure zero data corruption.

## 4.4 UI Design Philosophy

The app utilizes a Material Design 3 'Night' aesthetic. This choice reduces eye strain during long-term learning planning and provides a premium, professional feel that matches the 'Professional Mentor' persona of the application.



## Chapter 5: Implementation

### 5.1 Tech Stack Stack

The system is built on a foundation of professional-grade tools:

- Mobile: Kotlin with XML Layouts and MVVM Pattern.
- Backend: Python 3.10+, FastAPI, SQLAlchemy, Gunicorn.
- Intelligence: OpenRouter (Primary Engine) and Gemini (Secondary Engine).

### 5.2 Backend Implementation Details

The FastAPI server utilizes asynchronous programming to handle concurrent IO-bound AI requests effectively. PDF text extraction is handled by dedicated workers, stripping metadata and images to present a clean, semantic string to the AI model.

### 5.3 Mobile App (Android XML) Implementation

Native Android development using Kotlin allows for deep system integration. We utilized 'View Binding' for safe UI access and 'Hilt' for Dependency Injection. The Roadmap is rendered using high-performance RecyclerViews with dynamic layouts.

### 5.4 AI Integration Module

Prompt engineering is the heart of our implementation. We use 'System Directives' to force the AI into returning strict JSON schemas. This allows our Android client to parse the career roadmap directly into objects, preserving UI consistency.

## Chapter 6: Final Product Showcase (Real Screenshots)

The following screenshots demonstrate the actual working state of the AI Career Mentor application on a physical Android device.

### 6.1 Dashboard & Identity Management

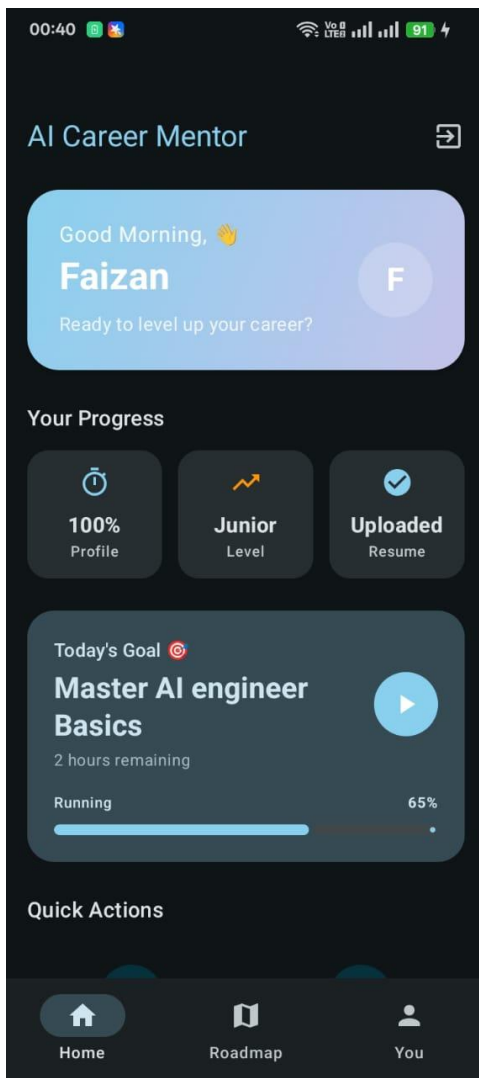


Figure 6.1: Main Home Dashboard

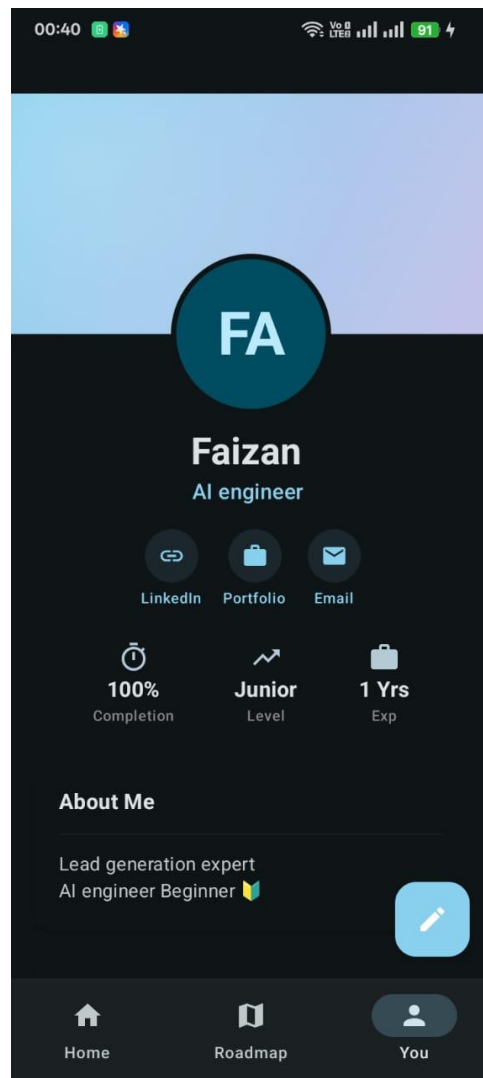


Figure 6.2: User Professional Identity

6.2 Interactive Roadmaps & AI Actions

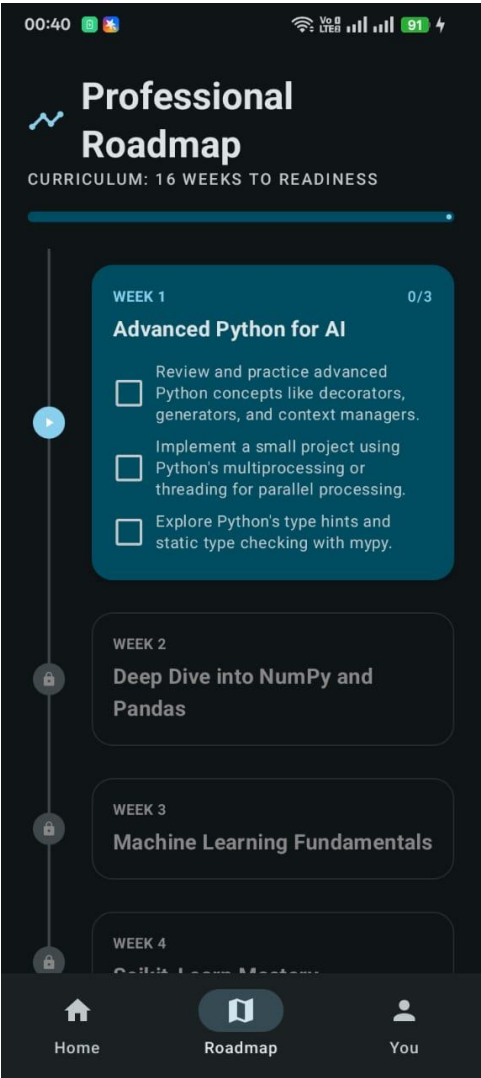


Figure 6.3: Dynamic Learning Roadmap

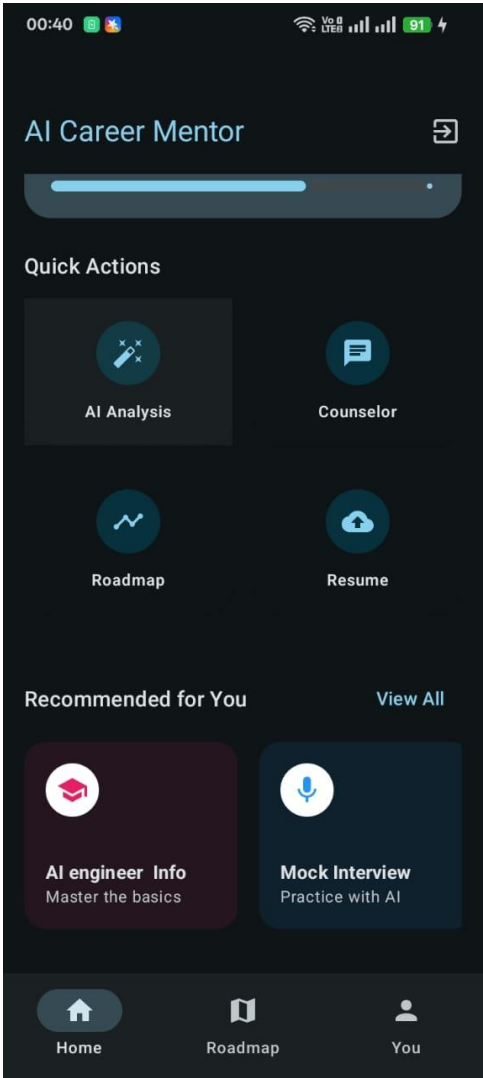
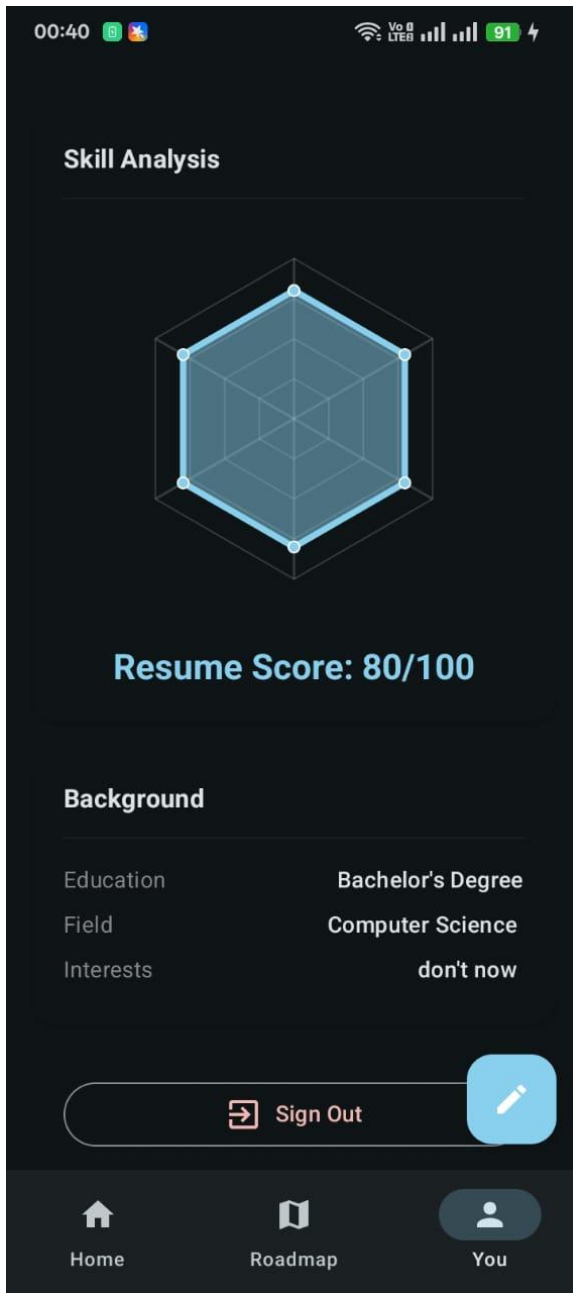


Figure 6.4: AI Quick Actions Menu

### 6.3 Skill Gap Analysis Chart



The Radar chart summarizes the user's skill distribution across their career vertical. It provides an immediate visual confirmation of where the user's strengths lie and where 'Skill Gaps' need to be addressed.

## Chapter 7: Testing & Quality Assurance

### 7.1 Testing Strategy

Our strategy utilized a combination of Black-Box functional testing and physical device UAT (User Acceptance Testing). Every API endpoint was verified using Postman before being consumed by the Android client.

### 7.2 Test Case Specifications

ID	Scenario	Input	Expectation	Result
TC-01	Secure Login	Correct Credentials	Access granted to Home	PASS
TC-02	Data Parsing	Complex 5-page PDF	Extracted Skill List	PASS
TC-03	Gap Logic	Switching Goal	Unique Roadmap Gen	PASS
TC-04	System Persistence	Restart App	Saved Roadmap Loaded	PASS

## Chapter 8: Conclusion & Visionary Future

The AI Career Mentor project successfully transitions the role of a career counselor from a human elite service to a mass-accessible automated tool. By integrating high-performance Kotlin development with the reasoning power of LLMs, we have created a scalable solution for global workforce preparation. The project demonstrates that with the right architecture, Artificial Intelligence can act as a force multiplier for human ambition.

### Future Enhancements

- Interactive Voice Mentorship for soft-skill training.
- Real-time connection to LinkedIn Job APIs for one-click applications.
- Gamification of learning milestones to increase user retention.

### References

1. Google Android Developers documentation - <https://developer.android.com/>
2. FastAPI High-Performance Framework Docs - <https://fastapi.tiangolo.com/>
3. LLM Reasoning Research (DeepSeek/Gemini) - <https://deepseek.com/>