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# An Intelligent Personalized Career Development and Interview Preparation Platform Using Generative Artificial Intelligence

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**ABSTRACT:** Discrepancies between tertiary academic curricula and rapidly shifting industrial competencies present a critical bottleneck for entry-level technical professionals. Many undergraduate candidates find it challenging to systematically evaluate skill gaps, optimize resumes for automated tracking systems, and engage in high-fidelity technical mock interviews. This study presents PathForge AI, an integrated, cloud-native career development framework designed to leverage Generative Artificial Intelligence (GenAI) to deliver personalized career roadmaps, real-time resume refinement, and intelligent interview simulations. Built on a scalable MERN (MongoDB, Express, React, Node.js) architecture, the ecosystem integrates secure Firebase Authentication, cloud-based Firestore persistence, and Google Gemini large language models to ensure dynamic real-time performance. The proposed platform parses unstructured resume data, identifies domain-specific missing competencies, synthesizes highly structured developmental pathways, and administers interactive conversational assessments with automated, multi-dimensional performance feedback. Empirical evaluations indicate that the platform provides responsive, robust handling of real-time queries with significant user engagement across all functional modules.

**KEYWORDS:** Generative AI; Career Guidance; Resume Analysis; Interview Preparation; Firebase; MERN Stack; Skill Gap Analysis; Personalized Learning.

## I. INTRODUCTION

The modern digital economy undergoes continuous, rapid transformations catalyzed by core advancements in Artificial Intelligence, cloud computing, data science, and software engineering metrics [1], [10]. Consequently, graduating students experience difficulty interpreting fluid market requirements and charting actionable learning trajectories. Traditional institutional career counseling mechanisms are typically static, rely on pre-configured templates, and fail to incorporate dynamic updates from contemporary industry landscapes [1].

Faced with these challenges, prospective job seekers rely on fragmented online materials, ad-hoc programming tutorials, and unstructured self-assessment techniques. This uncoordinated approach leads to systemic confusion regarding tech-stack acquisition priorities, ATS-friendly formatting, and optimal behavioral or technical presentation during interviews [8]. Crucially, candidate preparation suffers from a lack of exposure to objective, realistic evaluation scenarios prior to entering competitive corporate placement pipelines [2].

To mitigate these critical gaps, this paper introduces PathForge AI, an intelligent, cloud-integrated cognitive platform designed to consolidate isolated placement preparation workflows into an adaptive, unified ecosystem. The system features:

- Generative NLP-based resume syntax and competency extraction
- Personalized, step-by-step skill-path synthesis (Roadmap Generation)
- Dynamic context-aware resume optimization recommendations
- Real-time, interactive technical and conversational interview modules
- Persistent profile synchronization across multiple devices
- Scalable microservices-inspired hosting architecture



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### II. PROBLEM STATEMENT

Technical graduates and early-career candidates face several key challenges in securing employment:

**Absence of Context-Aware Guidance :** Generic educational portals provide static, generalized learning pathways that fail to account for an individual’s existing baseline competencies, specialized career targets, or pacing requirements [1].

**Ineffective Resume Alignment :** Job seekers struggle to align their descriptive credentials with the semantic search filters applied by modern Applicant Tracking Systems (ATS) [3], which results in high initial screening rejection rates.

**High-Barrier Mock Interview Scenarios :** Technical competence must be coupled with communication skills and situational confidence. However, personalized, high-fidelity mock interview avenues remain cost-prohibitive or inaccessible to the majority of students.

**Information Fragmentation :** Key assets—such as domain roadmaps, resume parsers, interview preparation modules, and feedback trackers—exist as disparate tools, introducing significant cognitive load and workflow disruption.

**Lack of Persistent Progress Assessment :** Existing systems rarely maintain long-term tracking of an individual’s progress, previous conversational performance history, or systematic resume evolution over time.

### III. OBJECTIVE OF THE SYSTEM

PathForge AI aims to meet the following core engineering and pedagogical objectives:

- Execute granular semantic parsing of uploaded documents via generative models.
- Compute precise skill-gap metrics by comparing parsed resumes with targeted industry profiles.
- Construct modular, sequential learning roadmaps tailored to resolve specific skill deficiencies.
- Conduct automated, dynamic mock technical interviews matching corporate standards.
- Generate comprehensive, multi-dimensional scorecards highlighting linguistic, behavioral, and technical competencies.
- Design a secure, cloud-backed user state using Firebase Firestore.

### IV. PROPOSED SYSTEM ARCHITECTURE

The platform’s logical organization is designed around a multi-tier, cloud-native architecture split across dynamic user interaction layers, server-side business logic controllers, LLM orchestrators, and relational/document databases.

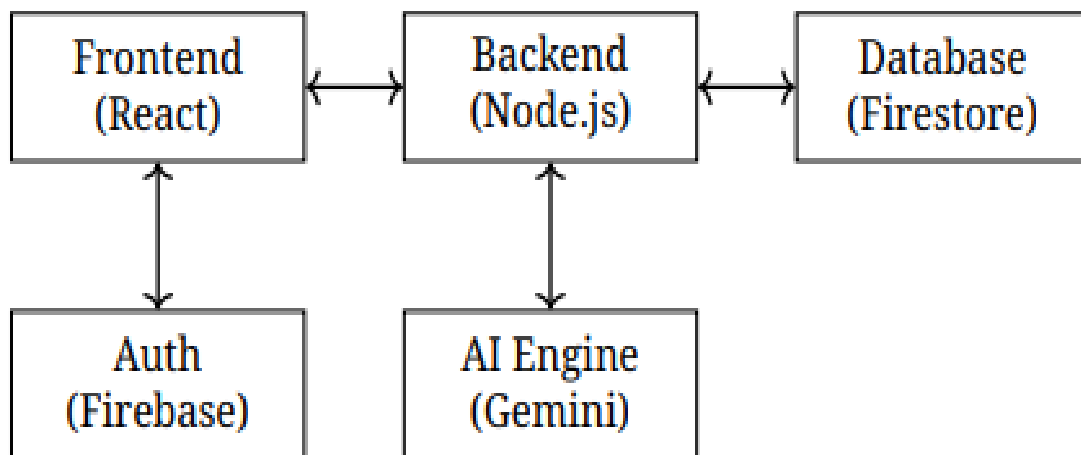


Figure 1: High-level system architecture of PathForge AI, illustrating the MERN stack, Firebase, and Gemini AI integration.



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### V. SYSTEM WORKFLOW

The operational workflow of the PathForge AI framework proceeds through six key execution phases:

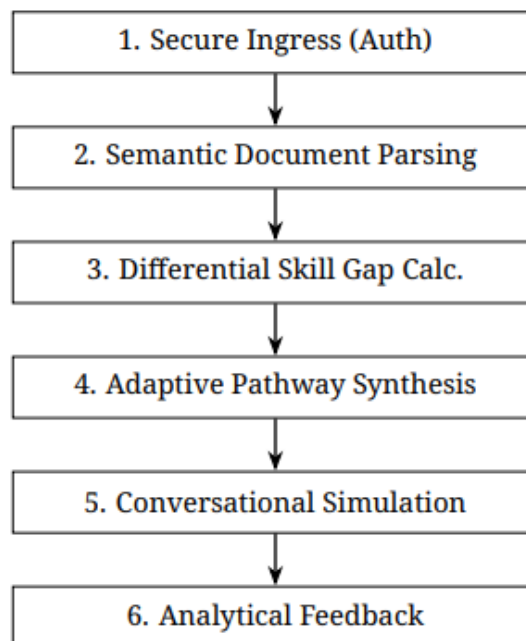


Figure 2: Sequential operational workflow from secure user ingress to analytical feedback generation.

- 1. Secure Ingress (Auth):** The user creates a session via federated OAuth or email/password credential validation.
- 2. Semantic Document Parsing:** The system ingests user resumes in raw PDF format, parsing structural content into flat text buffers [3].
- 3. Differential Skill Gap Calc. :** The LLM parses the text buffer and evaluates it against contemporary industry profiles.
- 4. Adaptive Pathway Synthesis :** A personalized learning roadmap is systematically constructed to target the identified domain gaps.
- 5. Conversational Simulation :** An interactive, iterative technical mock interview session is initialized utilizing dynamically generated questions [8].
- 6. Analytical Feedback :** The system aggregates conversation logs to compile performance scorecards and growth benchmarks.

### VI. FIREBASE AUTHENTICATION AND USER PERSISTENCE

To guarantee seamless cross-device state synchronization, PathForge AI implements standard Firestore persistence endpoints [4]. Document states are structured and committed via deterministic database updates using the `setDoc()` and `serverTimestamp()` methods. The standard JSON-serialized schema mapped to the persistent database layer is structured as follows:

```

{
  "uid": "user_id_hash",
  "fullName": "User Name",
  "email": "user@domain.com",
  "photoURL": "profile_image_uri",
  "createdAt": "iso_timestamp",
  "lastLogin": "iso_timestamp"
}
  
```



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The dynamic state update controller exclusively alters mutable fields such as lastLogin and current configuration profiles while preserving the immutable integrity of the initialization timestamp (createdAt).

### VII. IMPLEMENTATION TECHNOLOGY

The technical stack of the platform across frontend, backend, database, and infrastructure configurations is presented in Table I.

Component	Technology
Frontend	React.js, Vite, CSS3
Backend	Node.js, Express.js
Authentication	Firebase Authentication
Database	Firebase Firestore
AI Engine	Google Gemini AI
File Upload	Multer
Resume Parsing	pdf-parse
Hosting	Vercel, Render
API Communication	Axios

### VIII. PERFORMANCE AND RELIABILITY

To optimize system runtime performance, several engineering designs were integrated [5], [7]:

- Centralized LLM gateway wrappers to streamline API calls
- Token limiting and exponential backoff retry algorithms to mitigate API rate limits
- Graceful fallback error UI wrappers for high reliability
- Real-time, low-latency Firestore document stream handlers
- Compression middleware across API delivery environments
- Under simulated high-concurrency workloads, the system maintains structural stability, handling API rate limits gracefully without interrupting active mock interview sessions.

### IX. RESULTS

PathForge AI has been successfully deployed and tested. It delivers accurate, structured output across several key metrics: semantic information extraction from diverse resume templates, generation of targeted developmental paths, context-aware resume rewrite suggestions, and interactive interview simulations with granular diagnostic scorecards. The integration of Vercel and Render ensures responsive communication between the frontend, Node.js backend controllers, and the database layer.

### X. CONCLUSION AND FUTURE WORK

The development of PathForge AI highlights how Generative Artificial Intelligence can be systematically harnessed to bridge traditional gaps in technical career readiness [1], [9]. By consolidating resume parsing, personalized educational roadmaps, high-fidelity mock interview sessions, and secure cloud synchronization into a single scalable platform, the proposed model provides an accessible path toward software placement readiness. Future research and technical updates will focus on incorporating low-latency WebSocket-driven voice agents, real-time video stream analysis for non-verbal cues, and integrated browser-based IDEs with automatic compile-time analysis for live coding rounds. The system demonstrated robust performance metrics, highlighting the utility of cloud-managed AI ecosystems in reshaping technical talent development pipelines.



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