



# International Journal of Innovative Research in Computer and Communication Engineering

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)





## International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCCE)

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# Unified Career Platform

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**ABSTRACT:** In today's recruitment environment, students often navigate a fragmented landscape of disconnected platforms for placement preparation, relying on separate tools for resume building, aptitude practice, coding challenges, and interview simulation. This disjointed approach hinders progress tracking, consistency, and personalized guidance. To bridge this gap, this paper proposes the Unified Career Platform (UCP), an AI-driven, end-to-end career preparation ecosystem that consolidates all essential training components. The platform features an Application Tracking System (ATS)-optimized resume builder integrated with Natural Language Processing (NLP) models that dynamically extract skills to generate interview questions. Furthermore, cutting-edge adaptive learning mechanisms alter the difficulty of aptitude, coding, and quiz modules in real-time based on user performance. Audio/video responses in Technical and HR interview simulations are evaluated for clarity, sentiment, and accuracy, providing users with objective, structured feedback. By offering a continuous feedback loop that tracks progress and personalizes subsequent practice sessions, UCP offers an efficient, focused, and data-driven learning workflow aligned with real-world recruitment standards.

**KEYWORDS:** Adaptive Assessment, ATS Optimization, Resume Screening, Natural Language Processing, Mock Interview, Performance Analytics.

### I. INTRODUCTION

Preparing for campus placements typically requires students to move across several standalone platforms—such as resume builders, aptitude-testing websites, coding portals, and interview preparation tools [1]. This fragmented approach makes it difficult to maintain consistency, measure long-term improvement, and receive personalized guidance based on individual strengths and weaknesses [2, 3]. A unified system that brings all stages of career preparation together can significantly streamline this process and offer a more structured learning experience [4]. Current market solutions are valuable but highly siloed [5]. Tools like Canva format resumes but lack ATS scoring [6]; coding platforms like HackerRank provide practice but do not integrate resume insights or interview readiness; and interview simulators offer mock sessions but fail to adapt questioning to a candidate's specific background [7]. The problem lies in the absence of a centralized framework capable of guiding candidates continuously from initial resume creation to final interview readiness [8]. Furthermore, dynamically interpreting performance data to recommend targeted improvements remains a major challenge [9].

To address this, organizations and educational institutions are exploring alternatives like AI-driven evaluations, NLP for resume tracking, and adaptive testing mechanisms [10]. The proposed Unified Career Platform addresses these challenges by merging resume analysis, adaptive aptitude and coding practice, quiz-based learning, interview simulation, and performance analytics into a single intelligent application [11]. Utilizing Natural Language Processing (NLP), the system extracts critical skill data from uploaded resumes to formulate highly relevant interview questions [12]. Tests adjust in difficulty according to the user's live performance, ensuring a personalized learning path [13]. Additionally, real-time evaluation of both technical and HR interview responses allows for deep semantic analysis and fluency checks [14]. This multi-layered feedback loop helps candidates prepare for placements in a structured, outcome-oriented manner [15]. Consequently, AI-based virtual HR mock interviews have proven to elevate traditional placement preparation methodologies [16, 17], rectifying disjointed user experiences and tracking holistic progress [18, 19]. The primary contributions of this work are listed below:

- 1) A unified platform integrating ATS-resume screening, coding practice, and mock interviews.
- 2) Dynamic difficulty adjustments using LLM and performance feedback loops.
- 3) Real-time analytical evaluation of candidate technical interactions [20].



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### II. LITERATURE SURVEY

[1] **Artificial Intelligence-Powered Recruitment Transforming Talent Acquisition through Intelligent Automation by Arup Roy Chowdhury et al. (2025, ResearchGate)**, presents a secure RAG architecture protecting against adversarial threats such as corpus poisoning. It validates retrieved documents through clustering and self-assessment to ensure only trustworthy context is used. The system improves robustness but increases computational cost and depends strongly on data quality.

[2] **Resume2Vec: Transforming Applicant Tracking Systems with Intelligent Resume Embeddings for Precise Candidate Matching by Bevara R.V.K. et al. (2025, ResearchGate)**, introduces Resume2Vec, a framework that overcomes traditional ATS keyword limitations using advanced transformer-based models (BERT, GPT, Llama). The system creates high-dimensional embeddings and uses cosine similarity to capture semantic relationships, resulting in a superior alignment with human evaluation. Experimental results showed performance enhancements of up to 15.94% in RBO scores over conventional ATS methods.

[3] **OpenCoderRank: AI-Driven Technical Assessments Made Easy by Dutta H.S. et al. (2025, ResearchGate)**, presents OpenCoderRank, a self-hosted platform for rigorous, time-bound technical assessments built with Flask and SQLite. It addresses assessment integrity in the LLM era by implementing strict anti-cheating measures, including full-screen enforcement and disabling copy-paste.

[4] **Implicit Skills Extraction Using Document Embedding and Its Use in Job Recommendation by Gugnani A. et al. (2024, ResearchGate)**, tackles the problem of implicit skill extraction from resumes using a framework that combines Document Embedding and few-shot learning with LLMs. The core logic utilizes algorithms like the PageRank algorithm, a weighted Jaccard Similarity, CNN, and the BERT model. This approach aims to create comprehensive candidate profiles for a job recommendation system that combines collaborative and content-based filtering for greater accuracy.

[5] **Application of LLM Agents in Recruitment: A Novel Framework for Resume Screening by Gan C. et al. (2024, arXiv)**, proposes an innovative LLM Agent framework to automate and enhance resume screening for large organizations. The process uses fine-tuned models like LLaMA2 and GPT-3.5/4 with Reinforcement Learning from Human Feedback (RLHF) and a specific instruction format for high accuracy. The framework structures screening into Text Classification, Evaluation & Summarization, and Automated Decision Making, and is proven to be 11 times faster than manual methods.

[6] **Virtual Self Practice Mock Interview Using Gen-Ai by Suguna M. et al. (2024, International Journal of Current Science (IJCS PUB))**, introduces a platform leveraging Generative AI and CNNs for audio/video analysis to create realistic mock interview simulations. The system dynamically adapts questions to the user's performance and offers constructive feedback on clarity, coherence, and confidence. This innovative tool helps students build a strong personal narrative and overcome interview anxiety by simulating real-world scenarios.

[7] **Secure Coding Practices for System Software Development by Taofeek A. et al. (2025, ResearchGate)**, emphasizes the critical importance of integrating security into every phase of the Software Development Lifecycle (SDLC). The paper outlines practices to mitigate common threats like buffer overflows and injection attacks through techniques such as input validation, memory safety, and strong cryptography. It advocates for rigorous testing using Static/Dynamic Analysis (SAST/DAST) and compliance with standards like OWASP and GDPR to enhance software resilience.

[8] **Prepwise: AI Mock Interview and Resume Builder by Nayak A. et al. (2025, International Journal of Scientific Research and Engineering Development)**, proposes Prepwise, an integrated AI platform combining voice-based mock interviews and an ATS-optimized resume builder. Built using Next.js, Vapi, and Google AI Studio, the system simulates real-world interactions and uses Natural Language Understanding (NLU) to tailor resumes to job descriptions. Initial testing showed significant gains, including a 30-40% increase in resume pass rates through ATS systems.



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### III. PROBLEM DEFINITION

Students and job seekers often struggle with a scattered preparation process, where resumes are built on one platform, aptitude and coding tests are taken on another, and interviews are practiced elsewhere [1,8]. This lack of integration results in minimal personalization, poor progress tracking, and inconsistent learning outcomes [19]. Moreover, traditional preparation tools do not adapt dynamically to a learner's performance, nor do they provide unified feedback across different skill areas. The problem, therefore, lies in the absence of a centralized system that can guide candidates end-to-end, from resume creation [8] to interview readiness [6] while continuously monitoring their growth and recommending targeted.

### IV. PROPOSED SYSTEM

The proposed Unified Career Platform brings together resume analysis [2], aptitude and coding practice [3], quiz-based learning, interview simulation [6], and personalized feedback within one intelligent application [1]. It uses NLP to analyze resumes, extract skills, and generate relevant interview questions. Aptitude and coding tests dynamically adjust based on user performance, ensuring a personalized learning path. The system evaluates both technical and HR interview responses using semantic analysis and fluency checks [6].

A real-time feedback loop tracks progress, highlights weak areas, and updates the difficulty of future sessions [19]. This unified workflow improves efficiency [5], enhances conceptual understanding, and helps candidates prepare for placements in a structured and outcome-oriented manner [1,8].

### V. EXISTING SYSTEM

A variety of tools exist in the current ecosystem, each focusing on a specific aspect of career preparation [1]: Resume builders such as Canva and NovoResume help format resumes but often lack ATS scoring and job-specific optimization [2].

Aptitude and coding platforms like HackerRank, LeetCode, and PrepInsta provide extensive practice material but do not integrate resume insights or interview readiness [3].

Interview simulators (Pramp, InterviewBuddy) offer mock sessions but do not adapt their questioning to the candidate's resume or previous performance [6].

Job recommendation platforms (LinkedIn, Indeed) focus on search and discovery without integrating skill assessment or personalized preparation [4].

While these tools are valuable individually, none of them offer a unified, adaptive framework that connects all stages of preparation into a single, data-driven system [1,8].

### VI. DESIGN AND METHODOLOGY

The Unified Career Platform (UCP) is designed as an integrated ecosystem that automates the placement preparation lifecycle. The methodology focuses on three core pillars: semantic ingestion, adaptive assessment, and performance analytics.

A. AI-Driven Resume Ingestion: The system employs PyMuPDF (fitz) to extract structured text from candidate resumes while minimizing formatting noise. This extracted content is analyzed via the Google Gemini 1.5 Pro model to map candidate skills against role-specific benchmarks.

B. Adaptive Learning Engine: Unlike static testing platforms, UCP implements a performance-based feedback loop for aptitude and coding modules. The difficulty scaling logic is governed by user "streaks":

- Escalation: Difficulty shifts to "Hard" upon achieving a 3-question win streak.
- Reduction: Difficulty reverts to "Medium" or "Easy" upon incorrect responses to ensure the user stays in the zone of proximal development.

C. Multimodal Interview Simulation: The interview module utilizes multimodal AI to evaluate user responses. The system analyzes the semantic correctness of technical answers and evaluates HR responses for fluency and sentiment, providing objective, structured feedback.



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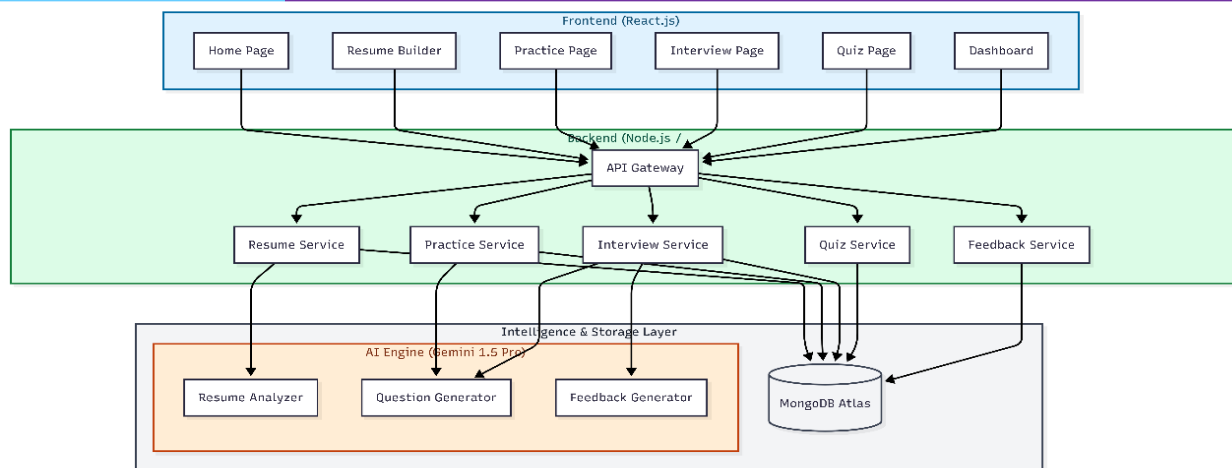


Figure 1: System Architecture

The overall system architecture of the Unified Career Platform is illustrated in above Fig. It is designed as a modular, full-stack ecosystem organized into three primary layers that work consecutively to ensure a fluid user experience.

### A. Frontend Layer

The presentation layer, built with React.js, serves as the primary interface for all modules, including the Resume Builder, Adaptive Practice Page, and Interview Simulation. Each module corresponds to a specific route and manages secure state-based user interactions.

### B. Backend Service Layer

This middle layer, developed using Node.js and Express, acts as the API Gateway and service orchestrator. It handles all business logic, manages data validation, and routes requests to the AI engine for content generation or scoring.

### C. Intelligence and Storage Layer

The data and intelligence layer integrates cloud-based predictive models and storage functions:

- 1) AI Engine: A cloud-based layer utilizing the Google Gemini 1.5 Pro model for semantic resume analysis, contextually relevant question generation, and objective interview feedback.
- 2) Database: Powered by MongoDB Atlas, it manages all persistent information, including user account details and historical performance metrics from practice and interview sessions.

## VII. IMPLEMENTATION

The implementation of the Unified Career Platform involves building the system architecture and integrating various technologies to streamline career preparation activities.

### 7.1 Frontend Components

React.js was used to create the core structure and modular components of the web application, and Tailwind CSS was used to style the frontend, ensuring a premium, responsive, and visually consistent user interface. JavaScript (ES6+) handles dynamic functionality such as state management and asynchronous interactions with backend APIs for real-time AI feedback.

### 7.2 Backend Components

Express, a robust web framework for Node.js, builds the server-side application. It handles routing, request processing, and seamless communication between the frontend client, the Gemini AI engine, and the MongoDB database. Mongoose serves as the Object Data Modeling (ODM) tool to define schemas and manage database operations storing user profiles, practice histories, resume data, and interview metrics.



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### 7.3 AI Integration and Key Functionalities

The Google Gemini API is utilized for implementing core AI features. It processes uploaded resumes for ATS scoring to evaluate compatibility with job descriptions. The system automatically generates tailored coding and aptitude questions based on the user's listed skills, continually adjusting to provide a personalized preparation experience. Furthermore, an integrated AI feedback loop evaluates user responses to technical and HR mock interview questions, providing objective feedback on clarity, correctness, and confidence.

## VIII. TESTING AND RESULTS

### 8.1 Performance Analysis

Table 1: Performance Analysis

Method	Accuracy	Precision (%)	Recall (%)	Latency (s)
Multinomial Naive Bayes	67.5	65.0	60.0	12.4
K-Nearest Neighbors	75.5	72.0	70.0	25.6
Random Forest (Baseline)	86.5	84.0	82.0	38.2
Proposed Hybrid UCP	93.0	91.0	95.0	6.2

Table 1 compares the classification accuracy, precision, recall, and processing latency of the proposed hybrid approach with baseline machine learning methods. The Proposed UCP Hybrid technique achieves the highest accuracy of 93.0% with the highest precision (91.0%) and recall (95.0%), while reducing latency to 6.2 seconds, demonstrating its superior efficiency and reliability over traditional resume parsing systems.

### 8.2 ROC Curve

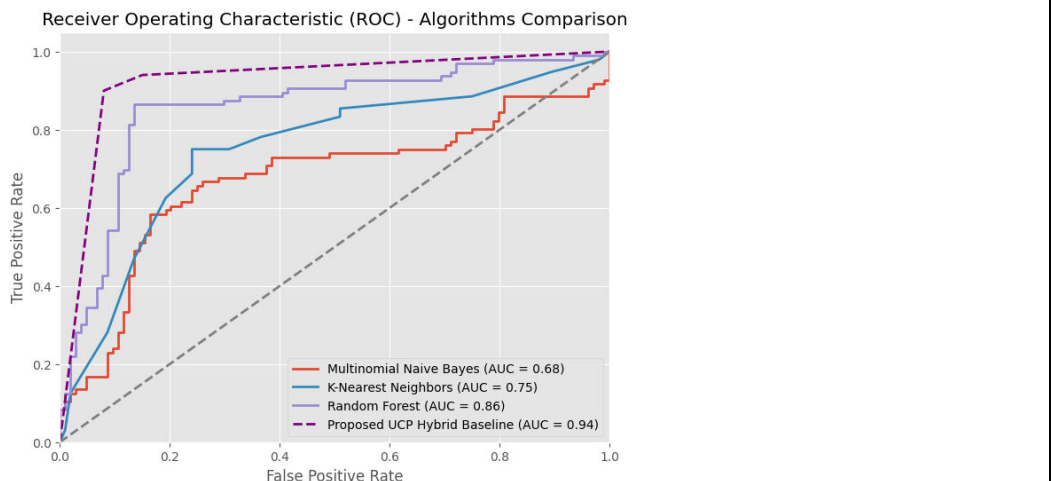


Figure 2: ROC Curve

The ROC curve given in Figure 2 validates the robustness of the Gemini API integration. The Area Under the Curve (AUC) serves as a measure of how well the platform distinguishes between classes. UCP Hybrid AUC: 0.94, indicating superior separation capabilities compared to the Random Forest baseline.



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## 8.3 RESULTS

### A) Dashboard:

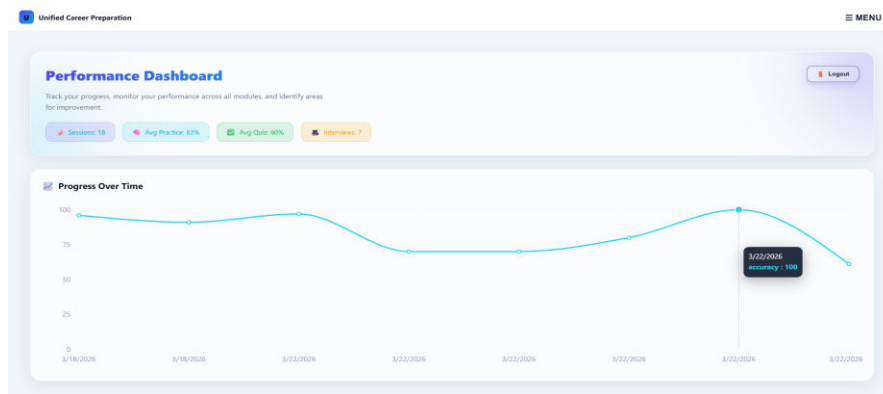


Figure 3: Dashboard

The dashboard displays the user's overall progress across the platform, visualizing their scores in quizzes, practice modules, and interviews.

### B) Interview Module:

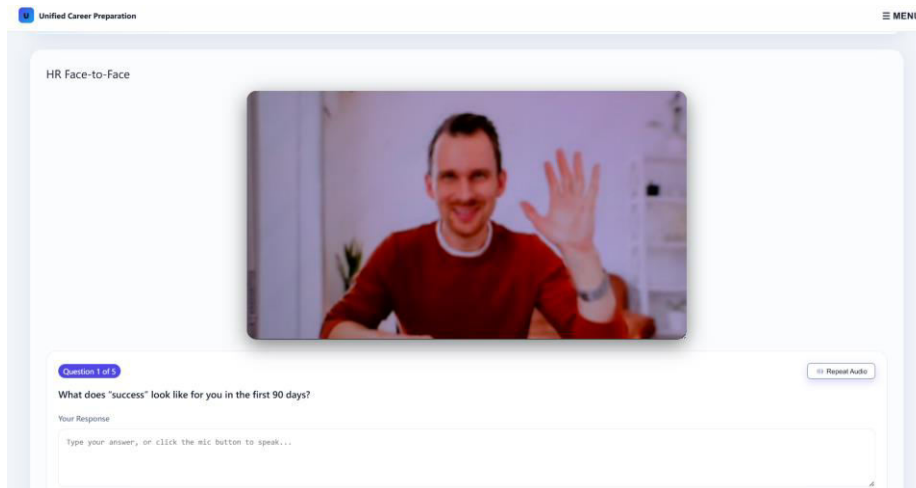


Figure 4: Interview Module

The interface showing an interview simulation session, including the scenario question and the subsequent constructive evaluation provided by the AI engine.



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## C) Resume and ATS Scoring:

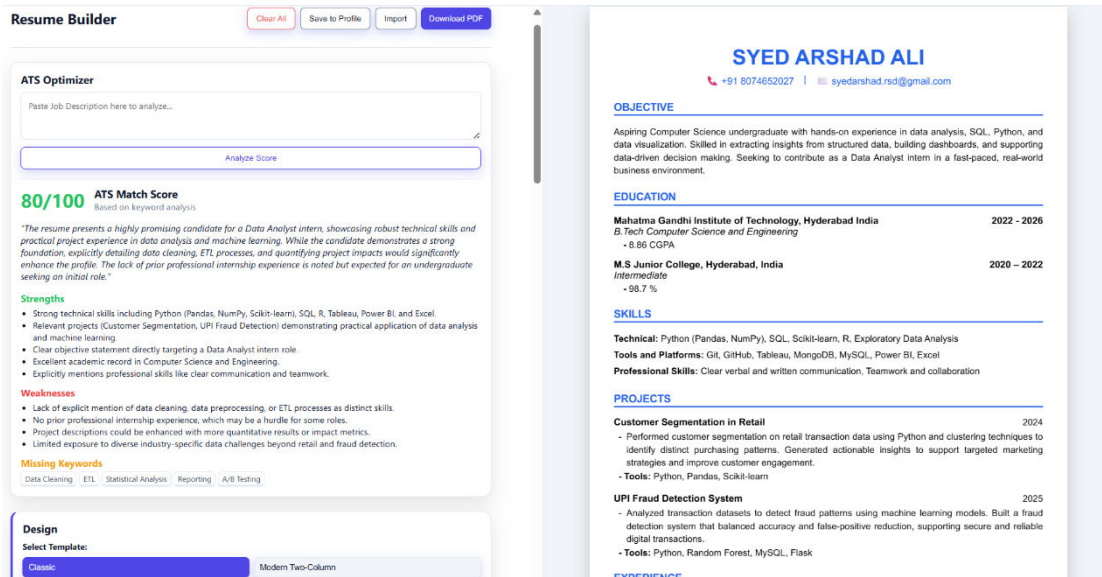


Figure 5: Resume Module

The user interface for the resume ats score, showcasing the real-time preview and the AI-generated ATS compatibility score and feedback.

## D) Practice Module:

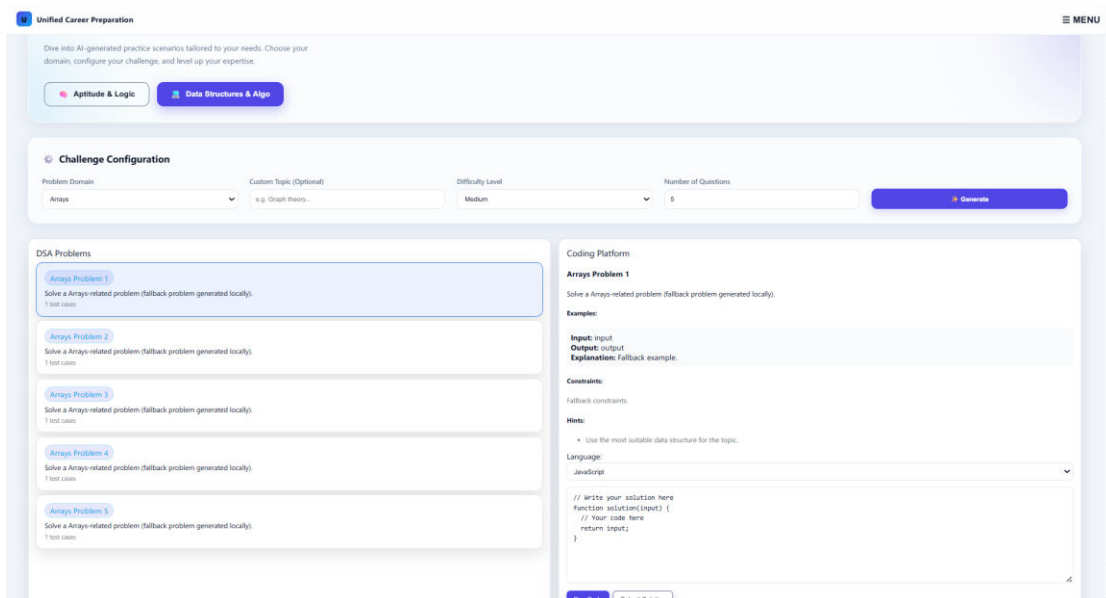


Figure 6: Practice Module

The dynamic practice environment where users can select their preferred language and solve technical challenges as well as practise aptitude questions, complete with immediate AI feedback and explanations.



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### IX. CONCLUSION AND FUTURE SCOPE

The Unified Career Platform successfully mitigates the fragmented nature of modern placement preparation. By bringing together resume optimization, adaptive practice assessments, and mock interview simulations into a single, AI-driven ecosystem, the platform provides candidates with a seamless path to career readiness. The integration of cutting-edge Large Language Models (LLMs) ensures that feedback is personalized, objective, and highly relevant to the candidate's specific goals. Ultimately, this system bridges the gap between learning and real-world recruitment expectations, empowering students to improve their employability efficiently.

While the current platform provides a robust foundation for career preparation, several enhancements can be introduced in the future:

**Video-Based Interview Analysis:** Integrating computer vision and speech-to-text models to analyse a user's facial expressions, confidence, and tone during mock interviews.

**Peer-to-Peer Mock Interviews:** Adding a real-time communication module (via WebRTC) to allow students to conduct mock interviews with each other.

**Advanced Analytics:** Implementing deeper predictive analytics to forecast a candidate's likelihood of clearing specific company interview rounds based on historical data.

**Job Board Integration:** Embedding a feature to scrape or integrate live job postings, allowing users to apply directly using their optimized platform resume.

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