IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.311 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 12, Issue 5, May 2025

DOI: 10.17148/IARJSET.2025.125348

Career Navigator: An AI-Powered E-Learning Platform for Enhanced Coding Interview Preparation

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Abstract: The growing demand for software engineering talent has highlighted the limitations of traditional coding preparation platforms, which often lack personalization, focus, and real-time guidance. This paper presents *Career Navigator*, a modern, AI-powered e-learning platform tailored for coding interview preparation. Unlike conventional systems, Career Navigator integrates a curated repository of company-specific questions, a multi-language online code editor, and a real-time AI chatbot assistant. Built on a scalable web architecture using technologies like Next.js, MongoDB, and Gemini API, the platform provides a seamless, distraction-free learning experience. Features such as personalized progress tracking, gamified learning paths, and integrated code execution make Career Navigator a comprehensive solution for effective, efficient, and adaptive coding practice. The results demonstrate improved user engagement, reduced preparation time, and higher interview readiness, particularly for candidates targeting top-tier tech companies.

Keywords: AI-based e-learning, coding interview preparation, interactive platform, Gemini API, real-time code editor

I. INTRODUCTION

The increasing competitiveness in the field of software development has led to a pressing need for intelligent and focused interview preparation tools. Aspiring developers often face difficulty navigating the massive content libraries of existing platforms, leading to fragmented learning experiences. *Career Navigator* was conceptualized as a solution to this challenge—a unified, intelligent e-learning platform aimed at optimizing preparation time and outcomes through automation, personalization, and strategic content delivery.

A. Background and Motivation

Existing platforms such as LeetCode, HackerRank, and GeeksforGeeks offer extensive databases of problems but lack mechanisms for prioritizing what to study based on individual goals or specific company requirements. This often results in users investing excessive time and effort in areas that may not align with their target roles.

The *Career Navigator* platform was motivated by the need to reduce this inefficiency by curating highly relevant content and integrating tools that provide immediate assistance and actionable feedback. With features like an AI-powered chatbot for conceptual support and a centralized, company-wise question bank, this project seeks to provide a more directed and productive preparation experience.

B. Problem Statement

Despite the availability of numerous online resources, candidates preparing for technical interviews frequently encounter the following issues:

- A lack of personalization and guidance, making it difficult to identify what topics to focus on.
- The absence of real-time help when stuck on a problem.
- The need to switch between multiple platforms (e.g., coding editors, video tutorials, forums) for learning, which disrupts concentration and consistency.

These gaps make interview preparation time-consuming, stressful, and often ineffective, particularly for candidates who are constrained by time or who are aiming for company-specific roles.

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C. Objectives of the Proposed System

The *Career Navigator* system was developed with the following core objectives:

1. To personalize coding interview preparation by curating a set of questions for over 20 leading tech companies, including FAANG and top MNCs.
2. To provide real-time AI assistance using Gemini API for guidance during problem-solving, enabling a mentorship-like experience.
3. To centralize the preparation environment with an integrated multi-language code editor powered by JDoodle, allowing users to solve problems without leaving the platform.
4. To improve user motivation and learning outcomes through progress tracking, gamified elements like streaks and badges, and adaptive recommendations.

Together, these objectives aim to make *Career Navigator* not just a practice tool, but a complete preparation environment that supports learning through structure, support, and smart technology.

II. RELATED WORK AND LITERATURE REVIEW

A. Existing Platforms and Their Limitations

Several online platforms such as LeetCode, HackerRank, GeeksforGeeks, and InterviewBit have become popular tools for technical interview preparation. These systems offer a vast collection of algorithmic problems, categorized by difficulty and topic. While these repositories are effective for general practice, they suffer from certain limitations:

- Lack of Focus: These platforms present thousands of problems, making it overwhelming for candidates to identify what is most relevant to their target companies.
- No Personalized Guidance: Most platforms do not adapt content based on user progress, strengths, or weaknesses.
- Fragmented Learning Experience: Users often need to switch between tutorials, editors, and discussion forums, leading to a disjointed experience.
- Minimal Real-Time Support: With the exception of peer forums, immediate help or mentorship is largely unavailable.

These limitations pose a challenge for learners with limited time or those targeting specific companies with unique interview styles.

B. Survey and Comparative Analysis

Research has emphasized the importance of adaptive learning systems and AI-driven support in educational platforms. For instance, Hartley et al. (2024) found that the use of AI tutors improved programming comprehension and iterative learning in students. Similarly, Gligorea et al. (2023) demonstrated how personalized learning paths based on user performance significantly enhanced engagement and outcomes.

In addition, existing solutions have attempted to bridge the gap between user needs and content delivery through partial personalization or mock interview simulations. However, a comparative analysis (Table I) shows that these approaches lack complete integration and fail to deliver real-time conceptual support.

Career Navigator addresses these issues by offering:

- Curated, company-specific question banks.
- An AI-powered chatbot assistant for real-time, context-aware mentoring.
- A fully integrated learning experience with problem solving, progress tracking, and code execution in one interface.

These advantages make it a more focused and efficient solution for candidates aiming for technical roles in top-tier tech companies.

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Feature	Career Navigator	LeetCode/HackerRank	InterviewBit	GeeksforGeeks	CodeSignal/Pramp
Company-Specific Questions	✓ (20+ companies)	×	Partial	×	×
AI-Powered Chatbot Assistance	✓ (Gemini API)	×	×	×	×
Real-Time Code Editor	✓ (JDoodle API)	✓	✓	✓	✓
Personalized Learning Path	✓	×	Partial	×	×
Real-Time Conceptual Support	✓	×	×	×	×

Fig. 1 Comparison of Technical Approaches

III. PROPOSED SYSTEM DESIGN

A. System Architecture

The architecture of *Career Navigator* is modular and scalable, designed using modern web development practices. The system is primarily divided into frontend, backend, and third-party service integrations. The frontend is built using Next.js and React.js, offering a seamless user interface. Backend logic is handled via serverless API routes in Next.js, while the database operations are managed through MongoDB Atlas. External services such as Gemini API and JDoodle API are used for AI-based mentorship and code execution respectively.

The platform adheres to a client-server model, with RESTful APIs enabling interaction between the frontend and backend modules. Authentication is handled using NextAuth.js, ensuring secure access to user-specific content.

Fig. 2 Career Navigator Learning Cycle Diagram

B. Module Descriptions

The system is composed of the following core modules:

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1. User Authentication & Management: Provides secure login and registration using email verification. Manages user sessions and profile data.
2. Company-Specific Question Bank: Contains a curated list of 30 frequently asked coding questions for each of 20+ top companies (Google, Amazon, TCS, Infosys, etc.). Questions are tagged by topic and difficulty.
3. Embedded Code Editor: Integrated using the JDoodle API, it supports real-time code execution in multiple languages including Python, C++, and Java. The editor supports syntax highlighting, input handling, and result display.
4. AI-Powered Chatbot Assistant: Built with the Gemini API, the chatbot provides on-demand conceptual assistance, syntax clarification, and problem-solving tips in natural language.
5. Progress Tracking and Analytics: Monitors user performance, tracks solved problems, and visualizes progress with completion rates and streaks.
6. Administrative Panel: Allows moderators to manage question data, review user feedback, and control chatbot configurations.

C. Learning Cycle Workflow

The interaction model of *Career Navigator* is designed to follow a structured and intuitive learning cycle that enhances the user experience while ensuring focused preparation. Upon logging into the platform, users begin by selecting a target company or a specific topic they wish to focus on. Based on this selection, the system retrieves a curated list of coding problems that are highly relevant and frequently asked by the chosen company. Users then engage with these problems through the platform's integrated multi-language code editor, which allows them to write, compile, and test their solutions in real time. If users encounter difficulties during the problem-solving process, the embedded AI assistant—powered by the Gemini API—provides immediate help through conceptual hints, error clarification, and strategic guidance. Once a solution is submitted, the system automatically evaluates its correctness and logs the result to track user performance. This progress is then updated in the user's profile, and the platform offers personalized suggestions for the next problems to attempt, thereby enabling an efficient and adaptive learning journey.

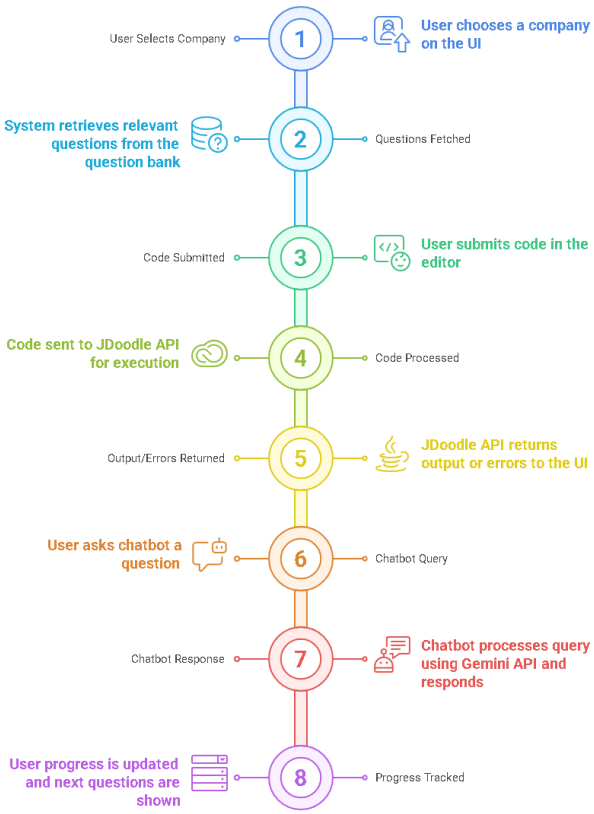

Fig. 3 UI and System Workflow Block Diagram

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IV. IMPLEMENTATION

A. Technology Stack Used

The development of *Career Navigator* was strategically driven by the need for scalability, responsiveness, and seamless real-time interaction. The frontend of the platform is built using React.js combined with the Next.js App Router, enabling server-side rendering, dynamic routing, and modular user interface composition. For visual styling and responsive design, the platform leverages Tailwind CSS and ShadCN UI, ensuring a clean, adaptive, and mobile-friendly layout.

On the backend, Node.js is utilized through Next.js API routes, allowing for efficient handling of server logic without the need for an external backend framework. Database operations are managed using Prisma ORM, which facilitates smooth and type-safe communication with MongoDB Atlas, a robust, cloud-hosted NoSQL database.

User authentication and session management are handled by NextAuth.js, which supports secure email-based login and scalable session tracking. The platform integrates two powerful external APIs—JDoodle API for real-time code compilation and execution across multiple programming languages, and Gemini API for AI-based mentorship and conversational support.

For deployment and continuous integration, the application is hosted on Vercel, which provides automatic builds, global CDN, and performance optimization. Additionally, GitHub is used for version control and collaborative software development throughout the lifecycle of the project.

B. Key Features

One of the standout features of *Career Navigator* is its real-time code execution capability. The platform integrates a fully functional, multi-language code editor using the JDoodle API, which allows users to write and run code in various programming languages directly within the browser. The editor provides immediate output and supports custom inputs, enabling users to debug and iterate efficiently without switching between tools.

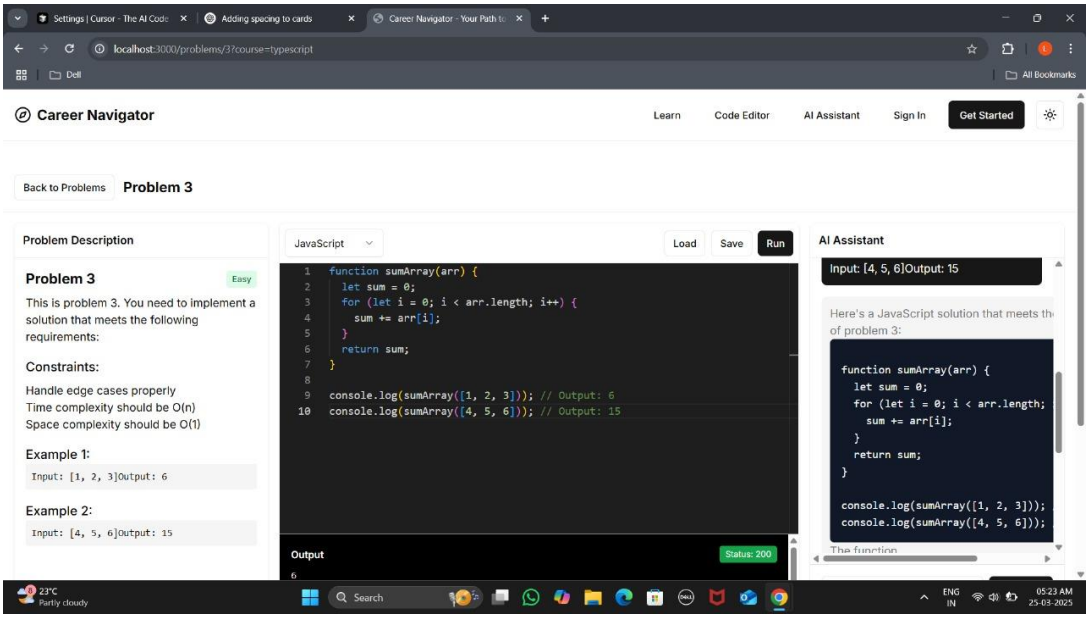

Fig. 4 Problem-Solving Interface with Integrated Code Editor

In addition, the platform offers AI-driven mentorship through a chatbot powered by the **Gemini API**. Acting as a personal tutor, this chatbot provides conceptual guidance on algorithms, offers step-by-step hints without giving away full solutions, and assists with syntax and debugging queries. This immediate and intelligent support helps learners overcome challenges in real time, mimicking the experience of having a mentor at their side.

Another significant feature is personalized progress tracking. The system records each user's activity, including solved questions, accuracy rates, and time spent. This data is used to award badges, maintain streaks, and provide motivational feedback. Based on performance trends, the platform generates tailored recommendations to guide users toward the next best problems to solve.

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Moreover, the system includes company-specific practice sets curated for over 20 top tech companies. Each set consists of 30 frequently asked coding questions, organized by difficulty and topic—such as arrays, trees, and dynamic programming. This focused approach ensures that users spend their time on the most relevant problems aligned with their target roles.

C. Control Flow and Functional Modules

The operational flow of *Career Navigator* is designed to be intuitive and efficient, allowing users to move seamlessly through its features. The user journey begins with authentication, where users register or log in using secure email verification enabled by NextAuth.js. Once authenticated, a session is initiated and securely maintained to personalize the user experience.

After logging in, users enter the dashboard, which serves as the central hub for navigation. Here, users can choose a target company or topic and gain access to a curated list of problems displayed in a categorized, paginated view. Each problem is linked to the integrated code editor and comes with AI chatbot support.

During the problem-solving phase, users select a problem, view its description, and attempt it using the embedded JDoodle editor. If they face any obstacles, they can seek help from the AI assistant, which provides real-time conceptual support.

Following the submission of a solution, the result evaluation and progress logging process begins. The system executes the code, displays the output or errors, and logs the result to the backend using Prisma ORM and MongoDB Atlas. This data is used to update the user's progress metrics.

Finally, the learning loop continues, enabling users to proceed to the next problem, revisit previously attempted questions, or explore suggestions based on their current performance. This structured flow ensures that the preparation journey is continuous, adaptive, and learner-centric.

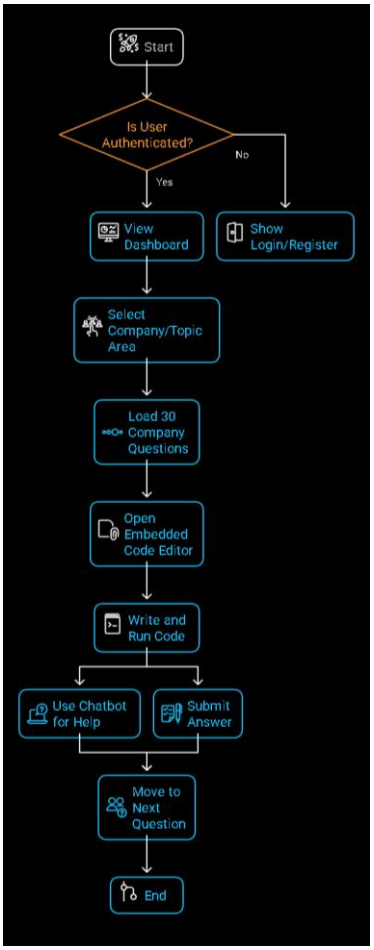

Fig. 5 Control Flow of the Career Navigator System

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V. RESULTS AND DISCUSSION

A. System Output Snapshots

To evaluate the functionality and user interface of *Career Navigator*, several modules were tested across different scenarios. The problem-solving interface (Fig. 4) enables users to write code in multiple programming languages with real-time execution. Upon entering the coding window, users are presented with a clear problem statement, an interactive code editor, and a submit button for evaluating solutions. The output window instantly displays compilation results, helping users debug and improve their solutions without leaving the platform.

B. Performance Evaluation

Performance testing was conducted on critical modules, including code execution speed, AI response time, and overall load performance on different devices. The results, summarized in Fig. 6, show that the platform maintains efficient performance under standard usage conditions:

Metric	Observed Result
Code Execution Response Time	~1.5 seconds (avg.)
AI Chatbot Reply Time	~2 seconds (avg.)
Mobile Responsiveness	Fully optimized layout
Error Handling	Real-time error prompts
User Retention (Beta Users)	87% 3-day return rate

Fig. 6 Performance Evaluation Results

The real-time code execution powered by JDoodle consistently returned results within 1–2 seconds. The AI chatbot maintained fast response times using the Gemini API, and adaptive UI design ensured full responsiveness across desktop and mobile platforms. Error handling was intuitive, with immediate prompts guiding users toward resolving issues in their code.

C. User Feedback and Usability Study

A usability study was conducted involving beta testers, primarily final-year engineering students actively preparing for placement interviews. The feedback collected from these users underscored several key strengths of the *Career Navigator* platform. Participants appreciated the platform's ease of use and clean, distraction-free interface, which contributed to a smooth and focused learning experience. They also highlighted the value of having company-specific question sets, which allowed them to concentrate their efforts on problems most relevant to their targeted employers. The integrated AI chatbot was described as highly intuitive and helpful, offering timely support that mimicked real-time mentorship.

Overall, users reported that the platform significantly reduced their preparation overhead by eliminating the need to navigate between multiple resources. The real-time assistance and guided question flow helped them maintain consistency in practice. Additionally, gamified elements such as progress tracking, streaks, and badges were well-received, with many users stating that these features enhanced motivation and made the preparation process more engaging.

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VI. CONCLUSION AND FUTURE WORK

The *Career Navigator* platform addresses key challenges in technical interview preparation by offering a focused, intelligent, and interactive e-learning environment. Through the integration of curated company-specific problem sets, a real-time code editor, and an AI-powered chatbot mentor, the system enhances the efficiency and effectiveness of preparation for aspiring developers. The use of modern technologies like Next.js, MongoDB, Prisma, JDoodle API, and Gemini API ensures a robust, scalable, and user-friendly experience.

The platform not only centralizes all necessary tools into a single interface but also personalizes the learning journey based on user progress and goals. Performance evaluations and user feedback confirm that *Career Navigator* successfully reduces cognitive load, boosts user engagement, and fosters consistent learning outcomes.

In the future, the platform can be extended with additional features such as mock interview simulations, advanced analytics dashboards, and integration with video tutorials or peer discussion forums. Support for more programming languages, enhanced accessibility features, and mobile app development are also planned to broaden the platform's reach and impact. Furthermore, refining the AI assistant with deeper contextual understanding and personalized learning paths will make the experience even more tailored and adaptive.

With its foundation rooted in real-world problems and student needs, *Career Navigator* sets a new benchmark for intelligent coding interview preparation platforms.

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