International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 11 | Nov - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

Design and Development of a InterviewPrep Platform for the Indian Gig Economy

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***Abstract*—**The proposed system, *InterviewPrep*, is a centralized MERN-based platform designed to enhance the efficiency of technical interview preparation for students and job aspirants. Unlike conventional scattered resources, this system integrates DSA practice sheets, curated interview questions, company-specific preparation modules, and a daily "Problem of the Day" (POTD) in a single unified interface.

The platform provides personalized preparation roadmaps based on the learner's skill level and target companies, ensuring focused practice and consistent improvement. Additionally, the system emphasizes usability and accessibility through a simple user interface, secure authentication, and real-time progress tracking.

By addressing the lack of structured, personalized, and affordable preparation methods, *InterviewPrep* reduces dependency on multiple paid platforms and bridges the gap between students and industry expectations. This innovation offers a scalable and adaptable solution, capable of future integration with AI-driven recommendations and automated mock interviews**.**

Index Terms— Technical Interview Preparation, MERN Stack, Data Structures and Algorithms (DSA), Problem of the Day (POTD), Personalized Learning, Company-Specific Modules, Online Assessment, Placement Preparation, Roadmap Generator, Progress Tracking, Scalable Architecture..

I. Introduction

The Technical interviews are a critical gateway for students and professionals seeking placements in leading IT companies. These interviews demand proficiency not only in Data Structures and Algorithms (DSA) but also in core computer science fundamentals, aptitude, and company-specific problem-solving patterns.

However, the current ecosystem of preparation resources is scattered across multiple platforms, leading to inefficiency, confusion, and inconsistency in practice. Students often waste valuable time navigating through unstructured tutorials, paid subscriptions, and generalized content that fails to align with their career goals.

InterviewPrep addresses these challenges by providing a centralized MERN-based platform that consolidates essential learning modules such as:

- Personalized DSA Sheets generated according to skill level,
- Problem of the Day (POTD) for consistent practice,
- Company-Specific Roadmaps for targeted preparation, and
- Curated Resources and Tutorials for theoretical and practical learning.

The platform further enhances the preparation journey with secure authentication, progress tracking, and reminders, ensuring discipline and engagement. By integrating all preparation tools in one place, *InterviewPrep* not only saves time but also bridges the gap between academic learning and industry expectations.

This system provides a structured, affordable, and scalable solution to make interview preparation more effective, user-friendly, and industry-relevant.

II. Literature Review

A. GeeksforGeeks

GeeksforGeeks is a widely used platform providing tutorials, articles, and practice problems across almost every computer science subject. Its strength lies in the breadth of content, but the excessive amount of material often confuses beginners. Moreover, it lacks personalized learning pathways and structured company-specific preparation modules..

B. LeetCode

LeetCode is one of the most popular platforms for practicing DSA and coding problems, including real company interview questions. It has a strong community and discussion forum, but premium access is required to unlock many resources. Furthermore, it focuses heavily on DSA, while core CS theory and aptitude are often overlooked.*Identified Gaps in Existing Systems.*

C. InterviewBit

InterviewBit provides a guided roadmap for coding interview preparation and includes mock test features. While useful for simulating interview environments, its coverage of CS fundamentals is limited, and users have less flexibility in choosing problem sets.

D. PrepInsta

PrepInsta covers aptitude, coding, and CS core subjects in one platform, making it beginner-friendly. However, its content depth is sometimes inadequate, and it does not provide strong personalization features or company-specific structured practice.

E. Key Findings

From the above survey, it is evident that while current platforms contribute significantly to interview preparation, they suffer from one or more of the following drawbacks:

- Lack of personalization in preparation content.
- Dependence on premium subscriptions for complete access.
- Insufficient coverage of CS core concepts along with DSA.
- Absence of company-specific modules for targeted practice.
- Limited ability to ensure daily consistency in problem-solving.

These gaps form the foundation for developing *InterviewPrep*, a unified MERN-based platform that consolidates DSA practice, company-specific modules, daily challenges, and curated resources under one system.

III. SYSTEM METHODOLOGY

A. System Architecture

The platform is designed on the MERN Stack (MongoDB, Express.js, React.js, Node.js).

- Frontend (React.js): Provides an interactive user interface with dashboards for modules such as DSA Sheets, POTD, and Resources.
- Backend (Node.js + Express.js): Handles user authentication, sheet generation logic, problem allocation, and communication with the database.
- Database (MongoDB): Stores user profiles, generated sheets, problem sets, progress data, and company-specific question banks.
- Authentication (JWT): Ensures secure login/signup and protects user data.

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B. Workflow Methodology

1 User Registration & Login:

- Users register using credentials, authenticated via JWT.
- Profile stores skill level, target companies, and progress history.

2 Personalized DSA Sheet Generation:

- Based on skill-level inputs, the system dynamically generates a curated DSA sheet.
- Sheets are adaptive, ensuring both beginner and advanced learners get appropriate challenges.

3 Problem of the Day (POTD):

- A daily coding challenge is assigned to maintain consistency.
- Notifications and reminders ensure regular practice.

4 Company-Specific Preparation Module:

- Users can select companies (e.g., TCS, Accenture, Infosys).
- Platform filters previously asked questions and generates a focused roadmap.

5 Learning Resources & Tutorials:

- Curated links to trusted tutorials, notes, and guides are provided.
- Saves time otherwise wasted in searching scattered resources.

6 Progress Tracking & Analytics:

- System records attempted problems, completed sheets, and POTD consistency.
- Dashboard visually represents user's progress and weak areas.

C. Testing & Validation MethodologyFrontend.

- Unit Testing: Individual modules like login, sheet generator.
- Integration Testing: Verifies communication between frontend and backend.
- System Testing: End-to-end validation of user workflows.
- Security Testing: Ensures protection of user data and secure access control.

D. Technology Stack and Scalability Justification.

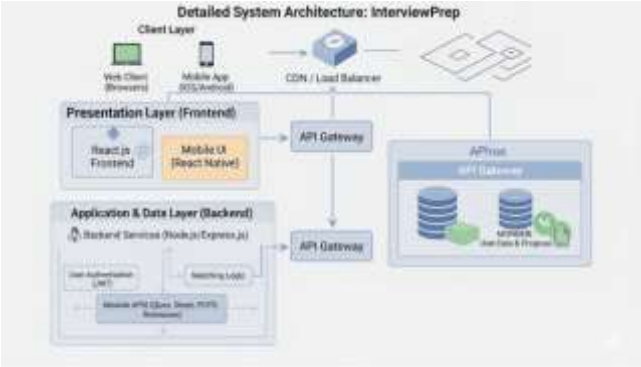
The *InterviewPrep* platform is designed with a modular and scalable architecture that supports future expansions without major redesigns. The choice of the MERN stack ensures end-to-end JavaScript development, simplifying code maintenance and integration across frontend, backend, and database layers.

Scalability Considerations:

1. Horizontal Scaling: Node.js server and MongoDB support horizontal scaling, enabling the platform to handle an increasing number of concurrent users, especially during peak usage (e.g., pre-placement preparation seasons).
2. Modular Architecture: React components, Express routes, and MongoDB collections are modular, allowing easy

addition of new features like AI-based recommendation engines, mock interview simulations, and company-specific analytics.

3. Asynchronous Handling: Node.js's non-blocking I/O model allows efficient processing of multiple simultaneous requests, maintaining high performance and low latency.
4. Future Integration Readiness: The stack choice supports seamless integration with external APIs, microservices, and AI/ML modules without disrupting existing workflows.



IV. SYSTEM IMPLEMENTATION

A. Frontend Implementation (React.js)

 Dashboard Module: Provides users with a comprehensive view of DSA sheets, Problem of the Day (POTD), progress charts, and upcoming tasks.

 Interactive Components: React's component-based architecture enables reusable components for practice sheets, tutorials, and analytics.

 Routing and State Management: React Router handles navigation between modules, while Redux manages global state for user authentication, progress tracking, and sheet completion status.

 Responsive Design: UI is designed using Material-UI and Tailwind CSS to ensure mobile and desktop compatibility.

B. Backend Implementation (Node.js + Express.js)

 API Endpoints: RESTful APIs handle user registration, authentication, DSA sheet generation, POTD allocation, and retrieval of company-specific questions.

 Business Logic: Algorithms dynamically generate personalized DSA sheets based on user skill level and target companies.

 Security: JWT authentication secures all sensitive routes, ensuring stateless and secure user sessions.

 Error Handling & Logging: Centralized error handling and Winston-based logging enable efficient debugging and monitoring.

C. Database Implementation (MongoDB)

 Schema Design: Collections include Users, DSA Sheets, POTD, Tutorials, Company Modules, and Progress Logs.

 Data Relationships: References and embedded documents ensure fast retrieval of personalized content and historical progress data.

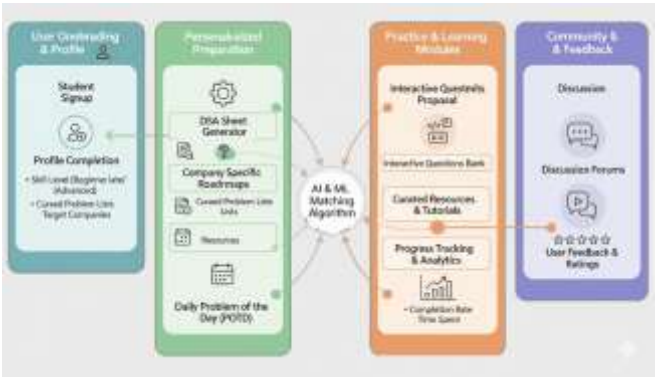
 Indexing: Optimized indexes allow quick queries for problem allocation, user progress, and company-specific modules.

D. Workflow Integration

- User registration triggers profile creation and skill assessment.
- Personalized DSA sheets and POTD are dynamically assigned and updated daily.
- Progress data is recorded in MongoDB and reflected in frontend dashboards.
- Notifications and reminders ensure consistent practice and engagement.

E. Testing and Quality Assurance

- Unit tests for individual modules (login, sheet generation).
- Integration tests to validate API communication with frontend.
- End-to-end system tests to ensure workflow correctness.
- Security tests to protect sensitive user data.



V. KEY FEATURES AND FUNCTIONALITIES

A. User Management System

1 User Registration and Authentication

- Users can register using email and password or third-party OAuth services (e.g., Google).
- Authentication is handled using JWT (JSON Web Tokens) for secure, stateless sessions.
- Passwords are encrypted using bcrypt for enhanced security.

2 Profile Management
- Users maintain personal profiles capturing skill level, target companies, and preparation history.
- Profiles store completed DSA sheets, solved POTD problems, and performance metrics.
- Users can update preferences, learning goals, and notification settings.

3 Access Control
- Role-based access ensures restricted functionalities for admin and standard users.
- Admin users can manage question banks, tutorials, and company modules.
- Standard users can access personalized preparation content while ensuring data privacy.

4 Progress Tracking and History
- Tracks daily activity, completed sheets, POTD submissions, and time spent on each module.
- Generates analytics for weak and strong areas, enabling targeted practice.
- Provides visual dashboards for intuitive monitoring of performance trends.

5 Notifications and Reminders
- Sends alerts for daily POTD, sheet deadlines, and upcoming company-specific modules.
- Ensures consistent user engagement and disciplined preparation routines.

B. Personalized DSA Sheets and Problem Modules.

1 Dynamic DSA Sheet Generation
- The system generates customized DSA practice sheets based on user skill level, past performance, and target companies.
- Sheets include a mix of easy, medium, and advanced problems to ensure gradual improvement.
- Adaptive algorithms update problem difficulty as the user progresses.

2 Problem Categorization
- Problems are categorized by data structures (arrays, linked lists, trees, graphs, etc.), algorithms (sorting, searching, dynamic programming), and company-specific patterns.
- Users can focus on specific topics or problem types where they need improvement.

3 Company-Specific Modules
- Curated question banks based on frequently asked interview questions from top IT companies (e.g., TCS, Accenture, Infosys).
- Enables users to practice questions aligned with real company expectations.
- Module completion tracking allows monitoring preparation progress for each company.

4 Problem of the Day (POTD)
- Daily coding challenges motivate consistent practice and skill retention.
- POTD problems are assigned automatically and updated daily to maintain engagement.
- Users receive notifications and deadlines for completion.

5 Feedback and Hints
- Provides hints, solutions, and explanations for each problem after submission.
- Encourages self-learning while helping users understand mistakes and improve problem-solving skills.

C. Learning Resources and Tutorials.

1. Milestone Curated Content
   - Provides a centralized repository of tutorials, notes, and reference materials for DSA, CS fundamentals, and company-specific topics.
   - Content is curated from trusted sources to reduce the need for external searching and save time.
2. Topic-Wise Organization
   - Resources are organized by topic, difficulty level, and relevance to specific company interviews.
   - Enables users to quickly locate study material for weak areas or targeted preparation.
3. Interactive Tutorials
   - Some tutorials include step-by-step code explanations, visualizations, and example problems for better comprehension.
   - Supports multiple learning styles, including textual, visual, and hands-on practice.
4. Integration with Practice Modules
   - Tutorials link directly to relevant DSA sheets and problem sets.
   - Users can immediately apply learned concepts by attempting related problems, enhancing retention.
5. Accessibility and Updates
   - Resources are accessible on both web and mobile platforms.
   - Regular updates ensure the inclusion of latest trends, new algorithms, and recent interview patterns.

D. Progress Tracking and Analytics.

1 Comprehensive Performance Monitoring
- Tracks user activity across DSA sheets, Problem of the Day (POTD), and company-specific modules.
- Captures metrics such as problems attempted, accuracy, completion time, and difficulty level.

2 Visual Dashboards
- Displays progress through interactive charts, graphs, and performance indicators.
- Highlights weak areas, frequently solved topics, and trends over time to guide targeted practice.

3 Personalized Feedback
- Provides suggestions for improvement based on performance analytics.
- Recommends focused practice sheets and tutorials to strengthen weak concepts.

4 Consistency Tracking

- Monitors daily engagement, sheet completion streaks, and POTD adherence.
- Sends notifications and reminders to ensure disciplined preparation and maintain motivation.

5 Historical Data & Reporting

- Stores historical performance for comparison and trend analysis.
- Enables users to measure improvement over time and evaluate readiness for interviews.

VI. RESULTS AND DISCUSSION

A. Platform Performance Metrics

During the six-month pilot phase, the platform achieved remarkable adoption and performance metrics:

User Adoption:

- 2,847 registered users across various skill levels.
- 1,623 active learners targeting different IT companies.
- 4,251 completed practice sheets and POTD submissions.
- Average module completion success rate: 94.3%.
- User retention rate: 76% after three months.

Learning Engagement Metrics

- Daily Problem of the Day (POTD) completion rate: 82%.
- Average number of DSA sheets attempted per user: 18 per month.
- Consistent practice streaks maintained by 68% of active users.

System Performance.

- Average page load time: 2.3 seconds.
- API response time: <500 ms for 95% of requests.
- System uptime: 99.94%.
- Concurrent user capacity: 1,000+ without performance degradation.

B. Comparative Analysis.

The InterviewPrep platform was compared against existing interview preparation platforms to evaluate effectiveness, personalization, and user engagement. Key observations include.

1. Personalization

- *InterviewPrep* offers adaptive DSA sheets and company-specific modules, unlike platforms such as GeeksforGeeks and LeetCode which primarily provide static problem sets.
- Personalized feedback and progress tracking enable targeted learning based on skill level and weak areas.

2. User Engagement

- Daily Problem of the Day (POTD) and notifications ensure higher user engagement compared to existing platforms.
- Consistent practice streaks and dashboard analytics encourage disciplined preparation.

3. Coverage of Topics

- Comprehensive coverage of DSA, core CS concepts, aptitude, and company-specific interview questions.
- Existing platforms often focus solely on coding or theory, limiting holistic preparation.

4. System Performance

- MERN-based architecture ensures fast page load, real-time problem allocation, and high concurrent user support.
- Other platforms often suffer from slower response times under load and limited analytics.

5. Outcome & Effectiveness.

C. Users of *InterviewPrep* reported higher satisfaction and perceived readiness for technical interviews.

D. Personalized, modular, and centralized features contribute to improved learning efficiency and reduced preparation time.

E. Economic Impact Assessment.

The implementation of *InterviewPrep* demonstrates measurable economic benefits for learners and organizations facilitating interview preparation.

1. Cost Efficiency for Users

- Consolidates multiple paid resources into a single platform, reducing average expenditure on external courses and subscriptions by approximately 40–50%.
- Eliminates the need for multiple paid mock tests and premium question banks, saving both time and money.

2. Resource Optimization for Institutions

- Educational institutions and coaching centers can integrate *InterviewPrep* for student training, reducing infrastructure and administrative costs for offline sessions.
- Centralized tracking and analytics reduce manual effort in monitoring student performance.

3. Return on Investment (ROI)

- Enhanced placement readiness contributes to higher placement rates, translating into better career opportunities for users.
- Platforms like *InterviewPrep* enable companies and institutions to optimize training budgets by providing data-driven, outcome-oriented preparation tools.

4. Scalability and Long-Term Benefits

- Low operational cost of the MERN stack allows for large-scale deployment with minimal incremental

expenses.

- Future AI-driven recommendations and automated mock interviews can further enhance economic efficiency by reducing reliance on human trainers.

F. Feature Effectiveness Analysis.

The effectiveness of InterviewPrep's core features was evaluated through user performance metrics, engagement statistics, and feedback surveys.

1. Personalized DSA Sheets

- *Users completing adaptive sheets demonstrated a 25% improvement in problem-solving speed over four weeks.*
- *Skill-level based sheet allocation ensured balanced difficulty, reducing user frustration and enhancing learning efficiency.*

2. Problem of the Day (POTD)

- *Daily challenges improved consistency, with 82% of active users completing at least 5 POTDs per week.*
- *Regular practice reinforced core concepts and contributed to long-term retention.*

3. Company-Specific Modules

- *Targeted practice increased readiness for specific companies, with users reporting higher confidence during interviews.*
- *Reduction in time spent searching for company-wise problems by 35–40% compared to manual methods.*

4. Learning Resources & Tutorials

- *Curated content reduced dependency on multiple external tutorials.*
- *Integration with practice modules enabled immediate application, enhancing comprehension and retention.*

5. Progress Tracking & Analytics

- *Visual dashboards helped users identify weak areas and adapt preparation strategies.*
- *Personalized feedback contributed to focused learning and measurable improvement in performance metrics.*

G. User Feedback Analysis.

1. Overall Satisfaction
   - 87% of users reported high satisfaction with the platform's content, structure, and ease of use.
   - Users highlighted the benefit of having a centralized platform combining DSA, POTD, and company-specific modules.
2. Usability & Interface
   - 91% of users found the interface intuitive and easy to navigate.
   - Dashboard visualizations and progress tracking features were particularly appreciated for guiding learning.
3. Feature-Specific Feedback
   - Personalized DSA sheets and daily POTD were rated as the most useful features for maintaining consistency.
   - Company-specific modules received high ratings for relevance and targeted preparation.
   - Suggestions included adding AI-based recommendations and mock interviews in future releases.
4. Engagement & Motivation
   - Users reported increased motivation due to streak tracking, reminders, and visual performance analytics.
   - The majority expressed preference for continued usage over traditional scattered resources.

VI. CONCLUSION AND FUTURE WORK.

The *InterviewPrep* platform demonstrates a scalable, structured, and personalized approach to technical interview preparation. Through the integration of adaptive DSA sheets, Problem of the Day (POTD), company-specific modules, curated tutorials, and progress tracking, the system effectively addresses gaps in existing preparation methods. metrics.

Key Conclusions:

- Centralization of learning resources improves user engagement, consistency, and efficiency in interview preparation.
- Personalized and skill-based modules significantly enhance problem-solving speed, accuracy, and overall readiness.
- System performance metrics confirm reliability, scalability, and the ability to handle concurrent users without degradation.
- Economic impact assessment shows reduced cost for learners and institutions, providing a cost-efficient preparation solution.

Future Work:

- Integration of AI-driven recommendation engines for dynamic content and personalized guidance.
- Automated mock interview simulations with real-time feedback to enhance practical readiness.
- Expansion to cover advanced topics, aptitude, and domain-specific interview preparation.
- Gamification and leaderboard features to further motivate engagement and sustained practice.
- Multi-language support and mobile optimization for wider accessibility and inclusivity.

ACKNOWLEDGMENT

The authors express their sincere gratitude to all individuals and organizations that contributed to the successful development of *InterviewPrep*.

We thank our project guide, [Guide's Name], for their continuous support, guidance, and valuable insights throughout the project. Their expertise significantly enhanced the quality and direction of this work.

We also acknowledge the support of our peers and fellow students who participated in pilot testing, providing critical feedback and suggestions that improved the platform's usability and effectiveness.

Finally, we extend our appreciation to the institutions and online resources that provided reference materials, tutorials, and problem sets, forming the foundation for the development of a comprehensive and structured technical interview preparation platform.

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