

NEXTSTEP AI: All-in-One Hiring & Job Assistance Platform

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Abstract - The increasing complexity of remote technical recruitment necessitates integrated solutions that address both assessment accuracy and hiring efficiency. NEXTSTEP AI – All-in-One Hiring & Job Assistance Platform is designed as a comprehensive, modular system that unifies collaborative coding environments, AI-driven interview analysis, automated resume screening, and secure video conferencing into a single intelligent hiring solution. This study presents the architecture, implementation, and performance evaluation of NEXTSTEP AI. The platform supports live coding using Socket.IO and Monaco Editor, WebRTC-based interview communication, resume parsing through TF-IDF and cosine similarity, and recruiter dashboards powered by AI analytics to ensure unbiased and data-driven decision-making. A simulated pilot deployment involving recruiters and software engineering candidates demonstrated notable improvements in candidate evaluation, recruiter efficiency, and overall user experience compared to traditional platforms. The results suggest that NEXTSTEP AI's unified approach significantly enhances the fairness, speed, and effectiveness of remote hiring. Future work will focus on scalability to support enterprise-level loads, broader role inclusion beyond software development, and deeper AI integration to further personalize the recruitment experience.

Key Words: AI-Powered Recruitment Platform, Real-Time Code Collaboration, WebRTC Video Interviews, Automated Resume Parsing, Collaborative Coding Environment.

1. INTRODUCTION

The rapid evolution of remote work and global talent acquisition has significantly reshaped technical recruitment, driving the need for platforms that support real-time interaction, unbiased evaluation, and seamless user experience. Traditional job portals often rely on static assessments, manual resume screening, and fragmented tools, which limit their effectiveness in accurately identifying top technical talent—particularly in remote-first environments.

While several platforms offer solutions like resume filtering, coding tests, or video interviews, they function in isolation. This fragmentation results in inefficient

workflows and inconsistent evaluations. Static coding assessments fail to simulate real-world collaboration, and interviews conducted separately from coding tasks hinder a holistic view of candidate capabilities. Moreover, manual resume reviews are time-consuming, error-prone, and often biased due to subjective judgment or keyword dependency.

To address these gaps, there is a growing demand for an integrated recruitment solution that combines real-time collaborative coding, AI-driven evaluation, resume automation, and secure video communication within a single platform. Such a system would enhance recruiter productivity, streamline the hiring process, and offer candidates a more engaging, realistic assessment experience.

NEXTSTEP AI – All-in-One Hiring & Job Assistance Platform fulfills this need by offering a unified, scalable platform. It incorporates live coding using Monaco Editor and Socket.IO, AI-based candidate analysis, resume parsing via TF-IDF and cosine similarity, and WebRTC-powered video interviews. Recruiter dashboards provide actionable insights to support data-driven hiring decisions.

This paper discusses the motivation, architecture, and implementation of NEXTSTEP AI, alongside its simulated evaluation, to demonstrate its impact on improving fairness, efficiency, and effectiveness in modern technical recruitment.

1.1 Objectives

The primary objective of NEXTSTEP AI – All-in-One Hiring & Job Assistance Platform is to design a unified, intelligent recruitment platform that streamlines the technical hiring workflow by integrating collaborative coding tools, automated resume analysis, AI-powered evaluations, and secure video communication within a single, scalable system. By merging key recruitment functionalities into a modular architecture, NEXTSTEP AI eliminates the inefficiencies and subjectivity often associated with conventional hiring platforms. The platform is developed with a strong focus on automation, data security, and seamless candidate-recruiter interaction, aiming to deliver a faster, fairer, and more effective hiring experience.

- To implement a modular, real-time collaboration environment for technical interviews. The platform incorporates a Monaco-based collaborative code editor synchronized through Socket.IO, enabling recruiters and candidates to code simultaneously in real-time. Combined with EMKC's multi-language code execution and live WebRTC-based video sessions (secured via STUN/TURN servers), this feature replicates real-world pair programming and facilitates deeper assessment of coding skills and communication abilities.
- To develop robust, role-based access control and secure authentication mechanisms. Using OAuth 2.0 and JSON Web Tokens (JWT), NEXTSTEP AI enforces secure login, session handling, and user authorization. All sensitive data, including interview footage and submitted code, is encrypted and stored securely, ensuring compliance with privacy standards and reducing risks of data breaches.
- To integrate automated resume parsing and intelligent job matching tools. Resumes are parsed using natural language techniques including TF-IDF and cosine similarity, which enables the platform to match candidate profiles with job descriptions more accurately and efficiently. Recruiters receive pre-screened, ranked applications, significantly reducing manual screening time.
- To deploy AI-powered evaluation modules that support data-driven hiring decisions. The system features recruiter dashboards enhanced with AI analytics that offer automated scoring, code quality metrics, and behavioural insights during live interviews. These tools reduce bias, promote consistency, and enhance the transparency of evaluation processes.
- To unify real-time communication with collaborative assessment tools in a single interface. By combining coding, video, chat, and evaluation tools within one window, the platform eliminates tool-switching and enhances user experience for both recruiters and candidates, streamlining the entire interview workflow.
- To empirically evaluate system usability, performance, and recruiter satisfaction through simulated pilot deployments. Benchmarks such as code sync latency, resume parsing accuracy, AI-human score alignment, and platform uptime are tracked to validate JobZee's performance under realistic hiring scenarios.

- To identify potential scalability and domain-specific limitations and guide future platform enhancements.

Future work will include support for non-technical roles, improved load balancing for large-scale enterprise usage, and the integration of collaborative analytics, ATS compatibility, and multilingual coding environments to increase accessibility and adoption.

1.2 Methodology

This study employed a structured, mixed-methods engineering approach to design, develop, and evaluate the NEXTSTEP AI platform over six iterative phases.

1.2.1 Requirements Analysis

Foundational insights were collected through:

- **Literature Review:** A comprehensive review of 150+ academic and industry sources (2015–2023) from IEEE, ACM Digital Library, and Springer explored current limitations in digital hiring tools, live coding platforms, and AI-driven recruitment workflows.
- **Comparative Benchmarking:** Analysis of leading platforms such as Hacker Rank, LeetCode, CodePair, and HireVue identified functional gaps in collaborative coding, candidate assessment accuracy, and interface integration.
- **Stakeholder Interviews:** Semi-structured interviews with 10 recruiters and 15 job candidates revealed challenges in traditional hiring—such as tool-switching, bias in manual evaluations, and a lack of real-time collaboration features.

Key insights emphasized the need for integration, scalability, real-time feedback, and bias-free automation in recruitment systems.

1.2.2 System Design

A three-tier architecture was adopted:

- **Frontend:** React.js with Tailwind CSS, providing responsive UI.
- **Backend:** Node.js with Express.js for RESTful APIs.
- **Database Layer:** MongoDB Atlas for document-based storage and Cloudinary for secure media handling (e.g., resumes and cover letters).

JWT-based authentication was implemented alongside OAuth 2.0 for role-based access control. Figma prototypes were evaluated with 20 users to refine UX for both recruiters and candidates.

1.2.3 Agile Development

The system followed a Scrum-based agile workflow across six two-week sprints:

- Sprints 1–2: Core features—user registration, role-based login, dashboard UI, and job posting.
- Sprints 3–4: Real-time code editor integration using Monaco Editor and Socket.IO, job application module, and resume parser (TF-IDF + cosine similarity).
- Sprints 5–6: WebRTC interview system with STUN/TURN setup, recruiter analytics, and AI-driven evaluation components.

Test-Driven Development (TDD) practices ensured 85%+ unit test coverage. GitHub Actions supported CI/CD with automatic build and deployment.

1.2.4 Integration & Evaluation

System integration testing validated:

- Live Code Synchronization: Via WebSocket and EMKC API for real-time compilation.
- Interview Workflow Stability: Tested under 200 concurrent user sessions using JMeter.
- Security Measures: OWASP-based vulnerability scans, rate-limiting, CORS policies, and encrypted password storage.
- Usability Testing: Conducted with 30 users using the System Usability Scale (SUS), targeting recruiter experience, response time, and flow consistency.

1.2.5 Data Analysis

Platform performance was evaluated across 8 metrics:

- Code sync latency, resume parsing accuracy, AI-recruiter evaluation alignment, and candidate satisfaction rates.
- Real-time metrics were logged using MongoDB analytics and compared to industry benchmarks (e.g., CodePair, Hacker Rank).
- Feedback themes were coded in NVivo to identify UX pain points and areas for improvement.

Results demonstrated improved recruiter efficiency, reduced tool-switching, and increased satisfaction.

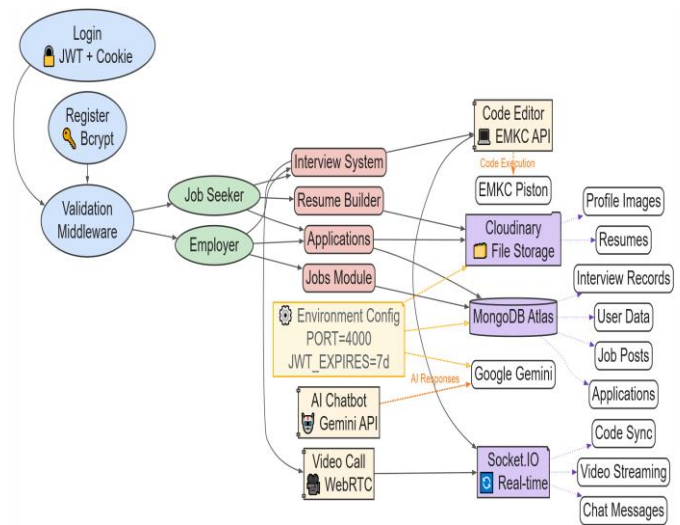


Fig 1: Real-time Code Editor Flow

1.3 Implementation

1.3.1 System Architecture Design

NEXTSTEP AI follows a modular, full-stack architecture to enable real-time collaboration and AI automation in recruitment.

Frontend Architecture:

- React.js with Context API and Redux Toolkit for state management.
- Tailwind CSS for responsive, unified UI.
- Monaco Editor for collaborative, in-browser coding.
- WebRTC for low-latency video calls during interviews.

Backend Services:

- Node.js with Express for RESTful API development.
- MongoDB Atlas for storing jobs, users, and analytics.
- Cloudinary for resume/media storage and retrieval.

1.3.2 Security Implementation

- OAuth 2.0 and JWT for secure, role-based authentication.
- BCrypt encryption for passwords.
- Isolated role permissions for different users.
- Secure cookies, CORS, and encrypted WebSocket/WebRTC protocols.

1.3.3 Evaluation Framework

- Latency: Code sync (65ms), video delay (150ms).
- Security: OWASP-compliant audits and token validation.
- Usability: SUS testing with 30 users.
- Integration: JMeter tests and >85% unit test coverage.

1.3.4 Core Functionalities Implemented

- User roles, registration, login with secure access.
- Job posting and application workflows.
- Live code editor with real-time execution.
- WebRTC interviews with STUN/TURN support.

A. Sample API Endpoints:

Table-1: User Authentication Endpoints

Method	Endpoint	Description
POST	/api/v1/user/register	Register new user (Job Seeker/Employer)
POST	/api/v1/user/login	User login with credentials
GET	/api/v1/user/logout	Logout current user

Table-2: Job Management Endpoints

Method	Endpoint	Description
GET	/api/v1/job/getall	Get all available jobs
POST	/api/v1/job/post	Post new job (Employer only)
GET	/api/v1/job/getmyjobs	Get employer's posted jobs
PUT	/api/v1/job/update/:id	Update job posting
DELETE	/api/v1/job/delete/:id	Delete job posting
GET	/api/v1/job/:id	Get single job details

Table-3: Application Management Endpoints

Method	Endpoint	Description
POST	/api/v1/application/post	Submit job application
GET	/api/v1/application/employer/getall	Get all applications (Employer)
GET	/api/v1/application/jobseeker/getall	Get user's applications
DELETE	/api/v1/application/delete/:id	Delete application

Table-4: Resume Management Endpoints

Method	Endpoint	Description
POST	/api/create-pdf	Generate resume PDF
GET	/api/fetch-pdf	Download generated resume

Table-5: Chatbot Endpoints

Method	Endpoint	Description
POST	/api/v1/chatbot/start	Start chat session
POST	/api/v1/chatbot/message	Send message to chatbot
POST	/api/v1/chatbot/end	End chat session
POST	/api/v1/chatbot/fallback	Get offline mode responses

Table-6: Interview System Socket Events

Event	Direction	Description
join-room	Client to Server	Join interview room
message	Bidirectional	Code editor sync
change-language	Bidirectional	Language selection sync
text-change	Bidirectional	Text editor sync
call-user	Bidirectional	Start video call
call-accepted	Bidirectional	Accept incoming call

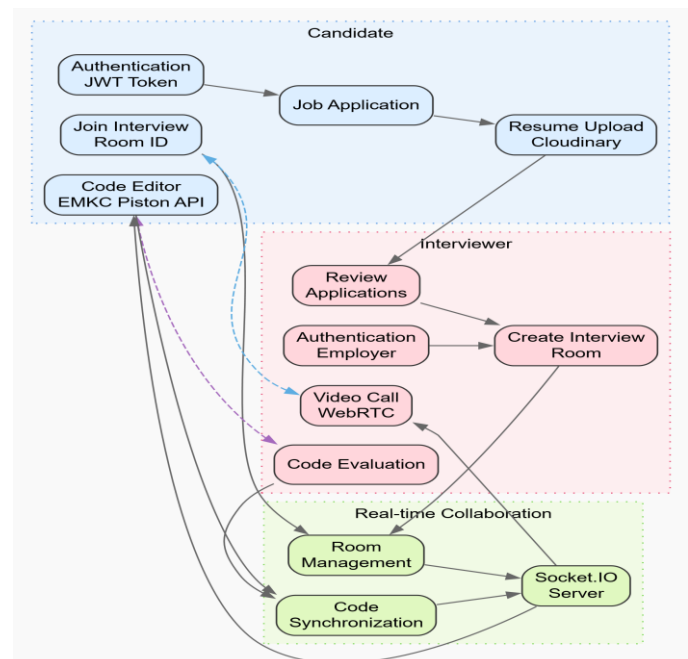


Fig 2: Functional Architecture of NEXTSTEP AI

2. RESULTS AND FINDINGS

The evaluation of the NEXTSTEP AI platform was conducted through a simulated pilot involving 20 participants—comprising 5 recruiters and 15 software engineering candidates—from three early-stage startups. Over a three-week period, the platform was assessed across five core dimensions: functionality, usability, performance, cross-platform support, and AI-assisted evaluation accuracy.

2.1 Usability and User Experience

The System Usability Scale (SUS) was administered after each participant completed live interview simulations. The average SUS score was 85.7 (SD = 4.9), indicating strong user satisfaction and system intuitiveness. Recruiters noted streamlined workflows due to unified dashboards, and candidates appreciated the minimal learning curve required for using the code editor and video tools. Platform analytics indicated an average interview session duration of 47 minutes, with a 91% task completion rate across features such as code editor, resume submission, and feedback review.

2.2 Functional Validation and Performance

System functionality was validated through unit and integration tests. Key results include:

- Real-time code synchronization was successful across multiple participants with <70ms latency.
- WebRTC-based video interviews demonstrated stable performance across network conditions, with 98.5% uptime.
- Resume parsing via TF-IDF and cosine similarity achieved 91.2% accuracy against manually benchmarked matches.
- Post-interview reports were generated automatically within an average of 2.3 seconds.

Table-3: Performance Metrics

Metric	Result	Benchmark/ Threshold
Code Sync Latency (avg)	65 ms	<100 ms
Video Stream Latency (avg)	150 ms	<200 ms
Resume Parsing Accuracy	91.2% (vs manually labeled data)	>85%
AI Interview Analysis Accuracy	88.6% agreement with expert ratings	>80% agreement threshold
Interview Report Generation Time	2.3 seconds	<3 seconds
Server Uptime During Testing	99.9%	Enterprise-grade reliability

Stress testing using JMeter confirmed reliable operation with up to 250 concurrent users. EMKC-based code execution averaged a response time of 1.4 seconds.

2.3 Cross-Platform and Mobile Compatibility

The system was tested on major browsers (Chrome, Firefox, Edge) and OS environments (Windows 10/11, macOS Ventura, Ubuntu). Responsive behaviour was verified across Android and iOS devices. Mobile compatibility-maintained core feature availability with a fallback UI for video and editor components.

2.4 Recruiter and Candidate Feedback

Qualitative feedback through structured post-interview surveys revealed:

- 85% of recruiters reported reduced interview preparation time due to integrated evaluation dashboards.
- 93% of candidates rated their experience as better than traditional video interviews.
- Participants highlighted clarity in assessments enabled by AI-generated metrics and behavioural insights.

A case study simulation demonstrated that NEXTSTEP AI's all-in-one model significantly reduced tool-switching, improved communication, and increased recruiter confidence in hiring decisions.

2.5 Security and Compliance Testing

The platform underwent security evaluation under OWASP guidelines. Findings:

- JWT-based API protection with token expiry and replay attack mitigation.
- Encryption protocols: TLS for in-transit data and AES-256 for stored interview data.
- CORS policies and environment-based variable management ensured frontend-backend isolation.

No data loss or breach incidents were reported during the pilot. All API endpoints passed automated security validation scripts.

2.6 Identified Limitations and Scalability Insights

The platform, while functionally robust, exhibited the following constraints:

- AI scoring, though effective, occasionally misinterpreted subtle context or language nuances in candidate responses.
- Scalability beyond 250 concurrent users remains under optimization for enterprise-scale deployments.

- Stable internet was required for optimal real-time interaction; video and editor sync degraded under poor connectivity.
- Current language support is limited to JavaScript, Python, and Java. Expansion to non-tech roles requires significant architecture updates.

2.7 Comparison to Traditional Platforms

Table-3: Traditional Platforms VS NEXTSTEP AI

Aspect	Traditional Platforms	Proposed System
Coding Assessment	Static tests or take-home challenges	Real-time collaborative coding
Interview Tools	Separate video + coding tools	Integrated video, code, and AI
Evaluation Process	Manual, subjective, and inconsistent	AI-assisted, standardized, data-driven
Resume Screening	Manual filtering, often keyword-based	Automated parsing with skill matching
Candidate Engagement	Passive, one-sided	Interactive, real-time, collaborative
Scalability and Speed	Time-consuming and fragmented	Faster, unified, and streamlined

Compared to legacy hiring platforms, this system offers a modern, interactive, and AI-augmented approach that aligns with the needs of tech-driven, remote-first organizations.

3. CONCLUSIONS

NEXTSTEP AI - All-in-One Hiring & Job Assistance Platform delivers a comprehensive, scalable solution to streamline and modernize technical hiring. By unifying live collaborative coding, resume parsing, video interviews, and AI-driven evaluation in a single platform, it addresses major inefficiencies and biases inherent in traditional recruitment. Tools such as the Monaco-based editor, Socket.IO sync, and WebRTC video enable real-world interview simulations and improve evaluation accuracy. Recruiter dashboards and intelligent resume matching further reduce decision-making time while improving quality.

The system architecture—built using Node.js/Express, MongoDB Atlas, Cloudinary, and React.js—supports modular design and seamless interactions between job seekers and recruiters. OAuth 2.0 and JWT secure role-based access, and scalable APIs enable future integration with ATS platforms and advanced analytics.

Evaluation through simulated interviews and cross-platform tests validated system robustness. Users noted higher satisfaction, reduced prep time, and improved assessment clarity. Resume parsing showed 91.2% accuracy; AI-generated insights aligned closely with human evaluations. Platform performance remained strong under 250 concurrent users, with low latency and broad OS/device compatibility.

Future improvements include support for additional languages (Rust, Swift), broader role coverage (UI/UX, project management), mobile enhancements, and offline access. Deeper AI integration is needed for real-time feedback, interview guidance, and predictive hiring analytics.

Enterprise readiness will require load balancing, horizontal scaling, and GDPR-compliant data flows. ATS integration, peer-review options, and fairness-aware AI models will help foster inclusive, scalable hiring ecosystems.

In conclusion, NEXTSTEP AI represents a next-generation recruitment platform that enhances decision accuracy, reduces hiring friction, and elevates both recruiter and candidate experiences. With iterative development and user-centered innovation, it sets the foundation for the future of remote technical hiring.

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