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RESEARCH ARTICLE OPEN ACCESS

DevgentAI – (Your Personal Interviewer)

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Abstract:

DevgentAI is an AI-powered interview practice system designed to improve interview preparation through intelligent simulation and real-time behavioral analysis. The platform provides users with realistic mock interview experiences across multiple professional domains while evaluating both verbal and non-verbal communication skills. The system integrates artificial intelligence, computer vision, speech recognition, and real-time analytics to deliver personalized feedback and performance insights.

The frontend is developed using React.js and Next.js, while PostgreSQL (Neon) is used for storing interview sessions and analytics. VAPI AI integration, OpenAI GPT-4, Deepgram Nova-2, and ElevenLabs are utilized for intelligent interview interaction and speech processing. The system provides multi-domain interview preparation, real-time performance tracking, and comprehensive analytics through an accessible web-based platform.

The project aims to democratize access to high-quality interview preparation by providing students, job seekers, and professionals with an intelligent virtual interviewer capable of continuous feedback and improvement tracking.

Keywords — AI Interview System, Computer Vision, Body Language Analysis, Speech Recognition, React.js, VAPI AI, Interview Preparation, Real-Time Analytics

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I. INTRODUCTION

Job interviews are among the most critical stages of professional growth and career advancement. However, many candidates struggle to perform effectively due to interview anxiety, lack of practice opportunities, insufficient feedback, and poor communication skills. Traditional preparation approaches such as reading interview questions, attending occasional mock interviews, or watching tutorials often fail to provide personalized, real-time evaluation of both technical and behavioral performance.

With the increasing adoption of online and video interviews, candidates are also expected to maintain strong virtual communication skills, including eye contact, posture, speech clarity, confidence, and professional presentation. Most existing preparation methods do not adequately address these requirements.

To bridge this gap, DevgentAI was developed as an AI-powered virtual interview assistant that simulates realistic interview environments and provides intelligent feedback. The system combines artificial intelligence, speech recognition, natural language processing, and computer vision to analyze both verbal and non-verbal communication during interview sessions.

The platform supports interview preparation across multiple professional domains including Web Development, Data Science, Machine Learning, Product Management, System Design, Cybersecurity, Finance, Digital Marketing, and others. Users interact with an AI interviewer through voice and video, while the system continuously evaluates speech quality, posture, gesture activity, facial behavior, and communication effectiveness.

RELATED WORK

[1] Enhancing Job Interview Preparation Through Immersive Experiences Using Photorealistic AI-powered Metahuman Avatars

Navid Ashrafi et al. proposed an immersive interview preparation platform using photorealistic AI-powered Metahuman avatars for VR, AR, and desktop environments. The system integrates conversational AI, gesture detection, emotion recognition, speech analysis, and biometric monitoring to provide realistic interview experiences. Deep learning techniques such as CNNs, RNNs, and transformer models were used for real-time feedback generation. The research highlighted improved user engagement and reduced interview anxiety through immersive simulations.

[2] "Hi. I'm Molly, Your Virtual Interviewer!" Exploring the Impact of Race and Gender in AI-powered Virtual Interview Experiences

Shreyan Biswas et al. investigated the effects of demographic representation in AI-powered interview systems. The study implemented a web-based asynchronous video interview platform integrating speech activity detection and non-verbal analysis. The research emphasized the importance of inclusivity and fairness in virtual interview systems while demonstrating the effectiveness of automated body language assessment..

[3] AI-Enhanced HR Interview Simulation for Realistic Candidate Assessment

Dr. S. Sarumathi et al. proposed an AI-enhanced HR interview simulation platform utilizing transformer-based models, reinforcement learning, and conversational AI. The system used Google Gemini LLM and real-time speech analysis to evaluate communication clarity, confidence, and technical understanding. The research demonstrated improvements in interview standardization, feedback consistency, and candidate assessment accuracy. These works collectively validate the effectiveness of AI-powered interview preparation systems and support the integration of computer vision, speech analysis, and intelligent conversational interfaces in interview training applications like DevgentAI.

II. PROBLEM STATEMENT

Many qualified candidates fail to perform effectively in job interviews due to anxiety, lack of preparation, poor communication skills, and absence of personalized feedback. Traditional interview preparation methods provide limited opportunities for realistic practice and fail to evaluate non-verbal communication aspects such as eye contact, posture, body language, and confidence.

III. OBJECTIVES

The main objectives of this research are:

1. To provide realistic AI-powered interview simulations across multiple professional domains.
2. To analyze verbal and non-verbal communication using speech recognition and computer vision.
3. To provide real-time feedback on posture, eye contact, gestures, confidence, and communication clarity.
4. To help users improve interview performance through personalized recommendations.
5. To maintain performance history and progress tracking for continuous improvement.

IV. SYSTEM ARCHITECTURE

A. System Components

The proposed system consists of the following components:

1. **User Interface (Frontend)**
   - Web-based user interface built using HTML, CSS, and JavaScript that offers users access to an interactive interface that is responsive and accessible.
   - Developed using React.js and Next.js.
   - Allows domain selection, interview interaction, and performance visualization.
   - Displays live body language metrics and feedback analytics.

2. **AI Interview Engine (Backend)**
   - Generates adaptive interview questions.
   - Uses OpenAI GPT-4 through VAPI AI integration.
   - Supports contextual follow-up questioning and dynamic interview flows.

3. **Speech Recognition and Body Language Analysis Module**
   - Uses Deepgram Nova-2 for real-time speech transcription.
   - Evaluates communication clarity, confidence, pace, and technical depth.
   - Uses MediaPipe and TensorFlow.js for real-time video analysis.
   - Tracks posture alignment, eye contact, gesture frequency, facial expressions, and body openness.
   - Provides live performance metrics during interviews.

B. Workflow

1. **User Registration**
   - New users register and sign in by providing basic credentials such as name, email, and password.

2. **Domain Selection and Interview Setup**
   - Users log in and select their preferred professional domain such as Web Development, Data Science, Machine Learning, Product Management, Cybersecurity, or System Design.
   - The system allows users to configure interview settings including experience level, job role, and technical stack for personalized interview generation.

3. **Camera and Microphone Initialization**
   - The platform requests permission to access the user's webcam and microphone using WebRTC MediaDevices API.

4. **AI-Powered Interview Simulation**
   - The AI interviewer generates domain-specific interview questions dynamically using OpenAI GPT-4 and VAPI AI integration.
   - Questions adapt based on user responses, technical accuracy, and performance level to simulate realistic interview experiences.

5. **Performance Evaluation and Feedback Generation**
   - The backend combines speech analysis and body language metrics to calculate overall interview performance scores.
   - Separate scores are generated for communication clarity, confidence level, technical depth, posture, eye contact, and gesture analysis.

6. **Progress Tracking and Data Storage**
   - Interview sessions, transcripts, body language metrics, and performance analytics are securely stored in the PostgreSQL database.
   - Users can track their improvement over multiple interview sessions and identify areas requiring additional practice.

V. METHODOLOGY

1. **AI-Powered Interview Simulation:** The system provides realistic interview simulations across more than 12 professional domains by generating adaptive interview questions using artificial intelligence and conversational AI technologies.
2. **Speech Recognition and Body Language Analysis:** User responses are captured and analyzed in real time using VAPI AI and Deepgram Nova-2 speech recognition to evaluate communication clarity, confidence, technical depth, speech pace, and filler word usage. The system uses MediaPipe and computer vision algorithms to analyze posture, eye contact,

shoulder alignment, gesture activity, head stability, and facial expressions during interview sessions.

3. **Evaluation:** The platform evaluates user performance through combined voice and body language analysis, generating separate metric-based scores along with overall interview performance feedback.
4. **Deployment:** A web-based platform was developed using React.js and Next.js, enabling users to register, attend AI-powered mock interviews, and receive detailed analytics and personalized improvement recommendations.

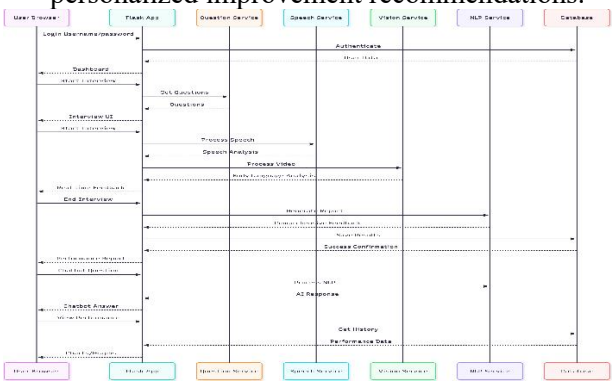


Fig. 1 High-Level Design

1. **User Authentication and Navigation**: Users begin by registering or logging into the platform using their credentials. After successful authentication, users are redirected to the Home Page where all interview preparation features are accessible.

2. **Domain Selection and Interview Preparation**: Users can explore multiple professional interview domains such as Web Development, Data Science, Product Management, Cybersecurity, and System Design. They can configure interview settings including job role, experience level, and technology stack.

3. **AI Interview Simulation and Real-Time Analysis:** Users proceed to the Interview Page where the AI interviewer asks adaptive domain-specific questions. During the interview, the system continuously analyzes speech patterns and body language through real-time audio and video processing.

4. **Performance Analytics and Feedback Generation:** The system evaluates communication clarity, confidence, technical depth, posture, eye contact, gestures, and overall interview performance. Detailed analytics and improvement recommendations are displayed on the Results Dashboard.

5. **Progress Tracking and Session Management:** Users can access previous interview sessions, compare historical performance trends, and monitor improvement over time. Users can securely log out from any page, ensuring privacy and session protection.

VI. RESULTS AND DISCUSSIONS

The system was tested using mock interview sessions across multiple professional domains with users having different communication styles, confidence levels, and technical backgrounds:

1. **Interview Simulation Performance:** The AI-powered interview engine successfully generated adaptive interview questions and simulated realistic interview conversations across various domains.
2. **Speech and Body Language Analysis:** The system effectively analyzed communication clarity, confidence, technical depth, posture, eye contact, gesture activity, and facial expressions in real time during interview sessions.
3. **Real-Time Feedback and Analytics:** The platform generated detailed performance reports including overall interview scores, voice analysis metrics, body language breakdowns, and personalized recommendations for improvement.
4. **Navigation and Accessibility:** The frontend interface provided smooth navigation between login, domain selection, interview sessions, analytics dashboard, and progress tracking sections with a responsive and user-friendly layout.
5. **Performance Tracking:** The platform maintained historical interview records, enabling users to compare previous sessions, monitor progress trends, and identify

strengths and weaknesses for continuous improvement.

VII. SNAPSHOTS

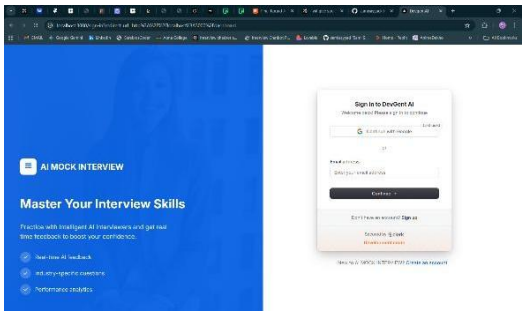


Fig. 2 Register Page

It provides a page for registration where users can sign up by providing their required credentials.

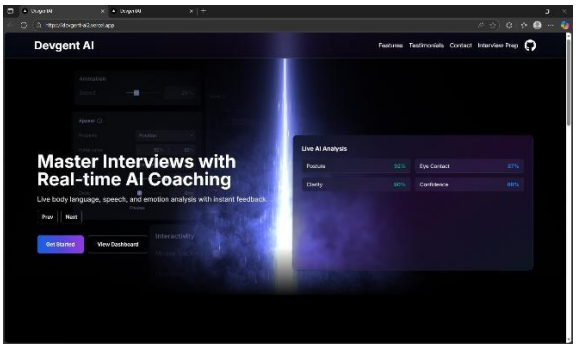


Fig. 3 Home Page

- The home page provides a professional and interactive interface introducing users to the AI-powered interview preparation platform.
- Users can quickly access key features such as domain selection, interview practice sessions, analytics dashboard, and progress tracking through clearly visible navigation options.
- The homepage highlights available professional domains including Web Development, Data Science, Product Management, Cybersecurity, and System Design.
- A responsive navigation bar allows seamless access to dashboard, interview sessions, analytics, user profile, and logout functionality.

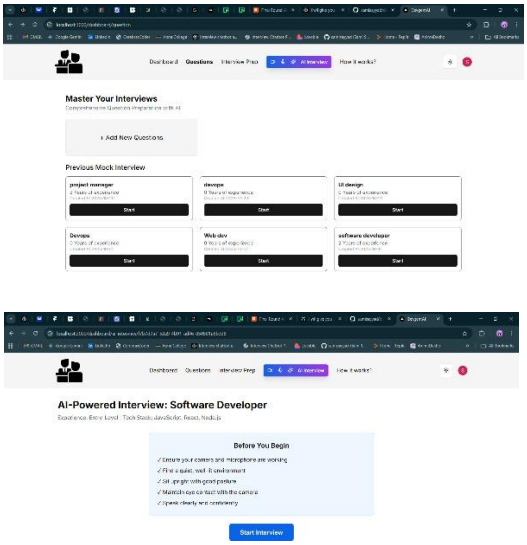
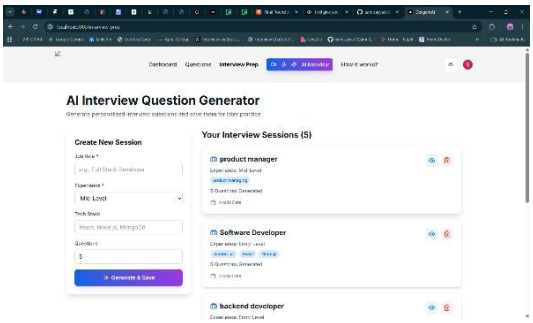


Fig. 4 Domain Selection and About Page

- The About section explains the purpose of DevgentAI, its role in interview preparation, and the integration of artificial intelligence, speech recognition, and computer vision technologies.
- The page highlights the importance of communication skills, body language, confidence, and technical knowledge in professional interviews.
- Detailed descriptions of supported interview domains and system capabilities are presented for user awareness and guidance.



- The page also explains how the platform provides real-time feedback and personalized recommendations for continuous improvement.

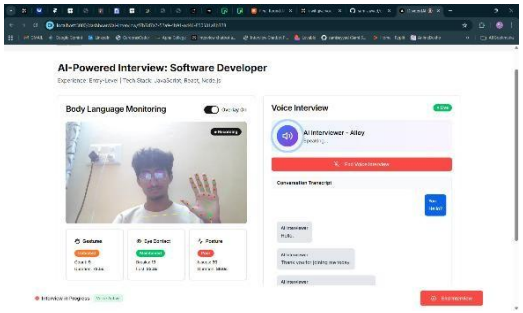


Fig. 5 Interview Interface

- The interview page provides a split-screen interface containing live video feed, AI-generated interview questions, and real-time body language analysis overlays.
- The system continuously captures user audio and video streams to analyze speech patterns, posture, eye contact, and gestures during the interview session.
- Adaptive questioning allows the AI interviewer to ask context-aware follow-up questions based on the user's responses and technical expertise.

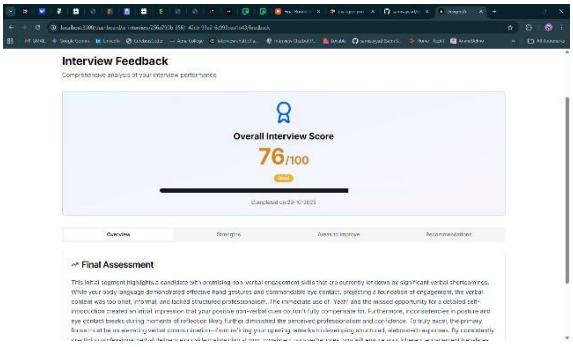


Fig. 6 Result Page

- The system calculates and visually displays overall interview performance scores along with detailed voice and body language analytics.
- The dashboard presents communication clarity, confidence level, technical depth, posture score, eye contact score, and gesture analysis using graphical visualizations and progress indicators.
- Personalized improvement recommendations are generated based on interview performance and behavioral analysis results.
- Results are presented using clear charts, score badges, color coding, and structured recommendations for better user understanding and engagement.

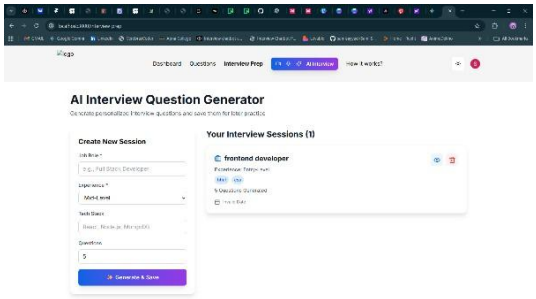


Fig. 7 Tracking Page

- The analytics page enables users to review historical interview performance data and compare scores across multiple interview sessions.
- Trend analysis charts help users monitor improvements in communication skills, confidence, posture, and technical performance over time.
- Users can access interview transcripts, session summaries, and detailed feedback reports for continuous learning and self-improvement.

VIII. CONCLUSIONS

DevgentAI demonstrates the successful integration of artificial intelligence, computer vision, and speech recognition technologies into an intelligent interview preparation platform. By combining real-time interview simulation with behavioral and communication analysis, the system provides users with comprehensive performance evaluation and actionable feedback. The platform enables candidates to improve confidence, communication skills, body language, and technical presentation through repeated practice sessions and progress tracking. DevgentAI also democratizes access to professional interview coaching by offering an accessible web-based solution for students, job seekers, and professionals. Future enhancements including advanced natural language processing, micro-expression detection, mobile applications, and industry-specific customization can further improve the effectiveness and scalability of the platform.

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