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Auralytica: An AI-Powered Intelligent Recruitment and Job Matching Platform

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Abstract

Modern recruitment faces serious challenges like manual resume screening, unconscious bias, poor candidate matching, and excessive time spent on administrative work. We developed Auralytica, an AI-powered recruitment platform that uses Large Language Models to help both job seekers and recruiters. Our system has 14 AI features including resume optimization, smart job matching, automated screening, interview question generation, and bias detection. We built it using the MERN stack (MongoDB, Express.js, React, Node.js) integrated with advanced language models. The platform gives job seekers personalized career advice while helping recruiters make better hiring decisions based on data. Our implementation shows major improvements in recruitment speed, candidate experience, and overall hiring quality through AI automation and intelligent decision support.

Keywords: *AI recruitment, job matching, resume optimization, intelligent screening, MERN stack, large language models, career advisory, recruitment automation*

1. Introduction

Today's recruitment industry struggles with many problems. Traditional hiring takes too much time, costs too much money, and often shows human bias. Research shows recruiters only spend about 6-8 seconds looking at each resume [1], which means they often miss good candidates because they rely on simple keyword matching. Job seekers also face difficulties trying to make their resumes work with Applicant Tracking Systems (ATS), writing good cover letters, and preparing for interviews. All these problems lead to poor matches between candidates and jobs, longer hiring times, and frustrated applicants.Recent progress in artificial intelligence, especially Natural Language Processing (NLP) and Large Language Models (LLMs), gives us new ways to fix recruitment problems [2]. However, most current solutions only focus on one part of recruitment instead of helping everyone involved in the process. We created Auralytica to solve these challenges using AI automation and smart decision support. Our platform works for three types of users: job seekers, recruiters, and administrators. Each group gets features designed specifically for their needs [9].

1.1.Key Contributions

Our main contributions include: A complete AI-powered recruitment platform with 14 specialized features for intelligent hiring A two-sided system that supports both job seeker and recruiter workflows New ways to use LLMs for resume optimization, candidate screening, and interview preparation Built-in bias detection and mitigation for job descriptions and hiring decisions Real-time career advice system that creates personalized development plans Scalable MERN stack architecture with efficient AI service integration [10].

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1.2. Paper Organization

The rest of this paper works as follows: Section II talks about related work and background, Section III explains the system architecture, Section IV describes how we implemented the AI features, Section V covers implementation details, Section VI discusses our results and evaluation, and Section VII concludes with future work ideas.

2. Related Work And Background

- Traditional Applicant Tracking Systems : Applicant Tracking Systems (ATS) have been the standard for recruitment management for more than 20 years. These systems mainly do resume parsing, keyword matching, and workflow automation [3]. But they have big problems like strict keyword matching that misses similar qualifications written differently, cannot understand context, and lack smart decision support.
- AI in Recruitment :Recent research has looked at different ways to use AI in recruitment. Researchers have tried machine learning for resume screening [4], predictive analytics to guess candidate success [5], and chatbots for initial screening [6]. But these solutions usually only solve one problem instead of providing complete recruitment support.
- Natural Language Processing in Resume Analysis : NLP techniques have been used to pull structured information from unstructured resumes, like using named entity recognition to find skills and experience [7]. Traditional NLP methods using rule-based systems and classical machine learning have not worked well because resumes come in so many different formats and writing styles.
- Large Language Model : Transformer-based Large Language Models have shown amazing abilities to understand and create human-like text [8]. These models can do complex reasoning, understand context, and generate good responses across many different areas. Using them for recruitment creates opportunities for smarter and more nuanced candidate evaluation.
- Limitations of Current Approaches : Current AI recruitment solutions have several problems: Limited features that only focus on single parts of recruitmen No personalized guidance for job seeker Not enough bias detection and preventio Poor integration between different recruitment stages Limited help for recruiter decision-making Auralytica fixes these gaps by providing a complete platform that uses advanced LLMs for intelligent automation across the entire recruitment process [11].

3. System Architecture

We designed Auralytica using a modern three-tier architecture based on the MERN technology stack, with added AI service integration. The system has three main layers working together to provide recruitment features shown in Figure1.

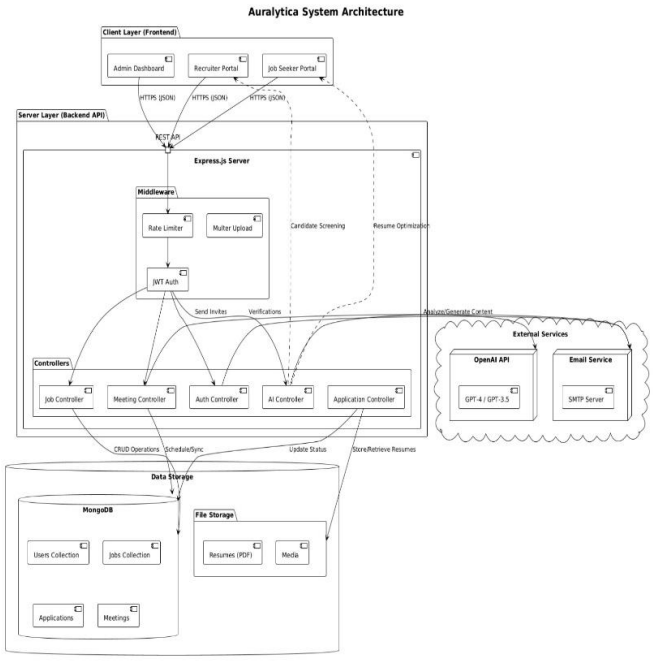

Figure 1 System Architecture

3.1. Frontend Layer

We built the presentation layer using React 18, creating three different portal interfaces: Job Seeker Portal: Lets candidates register, browse jobs, apply for positions, optimize resumes, generate cover letters, practice mock interviews, and get career guidance. Recruiter Portal: Allows companies to post

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jobs, screen applicants, generate interview questions, compare candidates, and access hiring analytics. Admin Portal: Provides system oversight, user management, and platform analytics. The frontend uses Material-UI and Lucide Icons to create modern, responsive interfaces that work well on both desktop and mobile devices [12].

3.2. Backend Layer

We implemented the application server using Node.js with the Express.js framework. It handles several important functions:

- RESTful API endpoints for data operations
- Authentication and authorization middleware
- File upload management for resumes and documents
- AI service orchestration
- Email notifications via Nodemailer
- Rate limiting for API protection
- The backend has six primary controllers:
- aiController: Manages 14 AI-powered endpoints
- jobseekerController: Handles job seeker operations
- recruiterController: Manages recruiter functions
- adminController: Administers system operations
- chatbotController: Powers interactive assistance
- meetingController: Schedules interviews and meetings

3.3.Database Layer

We use MongoDB as our primary database because it stores data in flexible JSON-like documents. Our schema design includes: Job Schema: Stores job postings with fields for title, description, requirements, location, salary, deadline, and AI-related metadata like bias scores and optimization suggestions. JobSeeker Schema: Keeps user profiles with personal information and authentication credentials. Recruiter Schema: Stores recruiter accounts with company information. JobApplicant Schema: Tracks applications with AIenhanced fields including AI scores (0-100), recommendations (STRONG MATCH, GOOD MATCH, MAYBE, REJECT), strengths, concerns, suggested interview questions, and generated insights. Admin Schema: Manages administrative access. ChatHistory Schema: Preserves conversation context for the chatbot. Meeting Schema: Schedules interviews with timezone support [13].

3.4.AI Integration Layer

Our AI service module provides a unified interface to Large Language Models through several key features:

- Token management and optimization to reduce costs
- Context truncation for large documents
- JSON response parsing for structured outputs
- Error handling and retry logic
- Rate limiting to prevent API quota problems
- We use different LLM configurations optimized for specific tasks, balancing response quality with computational cost.

4. Ai-Powered Implementation

Auralytica has 14 specialized AI endpoints split into job seeker features, recruiter features, and analytics capabilities.

4.1. Job Seeker Features

- AI Resume Optimizer: This feature looks at candidate resumes and gives detailed optimization recommendations. The system works in several steps:
  - Parses uploaded PDF resumes using the pdf-parse library
  - Creates an ATS compatibility score from 0 to 100
  - Finds missing keywords compared to target job descriptions
  - Suggests improvements ranked by impact (HIGH,MEDIUM, LOW)
  - Recommends sections to add or remove
  - Detects formatting problems
  - Provides clear steps for improvement

We designed the LLM prompt to make the model act like an expert resume consultant, looking at strengths and weaknesses and giving specific, actionable feedback. The system cuts resume text down to 2000

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tokens and job descriptions to 1000 tokens to process efficiently[14].

- Smart Job Matching: This intelligent matching system recommends jobs based on analyzing the whole candidate profile:
  - Gets available job postings from the database
  - Analyzes candidate skills, experience, and preferences
  - Compares the profile against job requirements using semantic understanding
  - Calculates match scores (0-100) looking at multiple factors
  - Identifies skill gaps for each position
  - Provides application tips specific to each job
  - Assesses salary fit and culture compatibility

The system returns the top 5 matches ranked by overall fit, with detailed reasoning explaining each recommendation.

- Cover Letter Generator: This feature automatically creates personalized, professional cover letters:
  - Takes job title, company name, and job description as input
  - Includes resume highlights relevant to the position
  - Adjusts tone based on what the user wants (professional, enthusiastic, formal)
  - Generates 250-350 word letters with proper formatting
  - Highlights 2-3 relevant achievements
  - Shows genuine interest in the specific company
  - Includes strong opening and closing statements
  - The generated letters are almost ready to use with very little editing needed.
- Mock Interview Conductor: This provides interactive interview practice with feedback in real-time:
  - Supports multiple interview types: Technical, Behavioral, HR, and Case Study
  - Conducts conversational interviews asking one question at a time
  - Rates answers as Excellent, Good, or Needs Improvement
  - Gives constructive feedback after each response
  - Adapts follow-up questions based on how candidates answer
  - Provides comprehensive assessment after 5 question exchanges
  - Evaluates technical accuracy, communication, problem solving, and culture fit

The system remembers conversation history to ask contextual questions and give personalized feedback [15].

- Career Path Advisor: This generates personalized career development roadmaps:
  - Analyzes current role, skills, and career goals
  - Creates step-by-step career progression plan with timelines
  - Identifies required skills for each career step
  - Recommends relevant certifications with cost estimates
  - Provides industry trend insights
  - Suggests alternative career pivots
  - Offers networking strategies
  - Lists immediate actionable steps

The advisor considers realistic timeframes (usually 2-3 years) and gives data-driven, achievable recommendations.

4.2.Recruiter Features

- Job Description Generator: This creates compelling, bias-free job descriptions:
  - Takes basic inputs like title, department, seniority, responsibilities, and skills
  - Generates complete job descriptions with standard sections
  - Uses inclusive, bias-free language
  - Adds SEO keywords for job board visibility
  - Structures content to work with ATS
  - Highlights unique selling points

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- Includes company culture information

Generated descriptions follow industry best practices with clear sections for summary, responsibilities, qualifications, and benefits.

- AI Resume Screening: This replaces manual keyword screening with intelligent evaluation:
  - Processes all applicants for a job posting (up to 50 at once)
  - Extracts text from PDF resumes
  - Evaluates candidates across multiple dimensions:
    - Technical skills match (0-100)
    - Experience relevance (0-100)
    - Education alignment (0-100)

•Culture fit indicators

  - Generates overall scores and recommendations
  - Identifies strengths and concerns for each candidate
  - Auto-generates tailored interview questions
  - Updates database with AI insights
  - Automatically shortlists candidates scoring above 70

This feature cuts screening time dramatically while improving how well we evaluate candidates.

- Interview Question Generator: This creates customized interview questions for specific candidates:
  - Analyzes candidate resume and job requirements
  - Generates 10 targeted questions with this distribution:
    - 40% Technical (based on resume skills)
    - 30% Behavioral (STAR method)
    - 20% Situational (role-specific scenarios)
    - 10% Culture fit
  - Categorizes questions by difficulty (Easy, Medium,Hard)
  - Explains why we are asking each question
  - Points out red flags and green flags in potential responses
  - Suggests follow-up questions
  - The personalized questions help interviewers dig into candidate-specific experiences effectively.
- Email Response Generator: This automates professional recruitment communications:
  - Supports multiple email types:
    - Application received confirmation
    - Screening call invitation
    - Interview invitation
    - Rejection letters (polite and constructive)
    - Job offers
    - Follow-up and next steps
    - Schedule change notifications
  - Personalizes content for each candidate
  - Maintains consistent employer brand voice
  - Includes clear next steps
  - Generates appropriate subject lines
  - Keeps a professional yet warm tone

This feature makes sure we communicate with all candidates on time and consistently.

- Candidate Comparison Tool: This enables side-by-side analysis of multiple candidates:
  - Compares 2-5 candidates at the same time
  - Evaluates across customizable criteria
  - Generates comparison matrices with scores
  - Provides ranking with detailed justifications
  - Identifies unique strengths and weaknesses
  - Offers hiring recommendations
  - Suggests best-fit scenarios for each candidate

The comparative analysis helps recruiters make informed hiring decisions backed by data.

- Bias Checker: This analyzes job descriptions for potential biases:
  - Detects gender-coded language
  - Identifies age-related bias indicators
  - Flags potentially discriminatory requirements
  - Analyzes inclusivity and accessibility
  - Provides bias score with detailed breakdown
  - Suggests neutral alternatives
  - Recommends improvements for diversity

This feature promotes fair hiring practices and helps

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organizations build diverse teams.

- Analytics Features
  - Hiring Analytics Dashboard: This provides data-driven insights into recruitment performance:
  - Tracks key metrics like applications, shortlist rate, and time-to-hire
  - Analyzes how effective different sourcing channels are
  - Monitors diversity metrics
  - Identifies bottlenecks in the hiring pipeline
  - Provides trend analysis and forecasting
  - Generates actionable recommendations
  - The analytics enable continuous improvement of recruitment strategies.

5. Implementation Details

A) Technology Stack

Table I summarizes the complete technology stack we used in Auralytica.

Table 1 Technology Stack

Layer	Technologies
Frontend	React 18, Material-UI, Lucide Icons
Backend	Node.js, Express.js
Database	MongoDB, Mongoose ODM
AI/ML	Large Language Models (LLM)
File Processing	pdf-parse, multer
Communication	Nodemailer, Axios
Authentication	JWT (planned), Session-based
Utilities	moment-timezone, natural

B) AI Model Configuration

We use different LLM configurations optimized for specific tasks:

- Resume Analysis: Max 2000 tokens, temperature 0.5 (focused)
- Job Matching: Max 2500 tokens, temperature 0.6 (balanced)
- Creative Writing: Max 1000-1500 tokens, temperature 0.7-0.8 (creative)
- Screening: Max 1200 tokens, temperature 0.3 (deterministic)

Temperature settings control how random the output is, with lower values for analytical tasks and higher values for creative content generation.

C) Security and Performance

Our key implementation considerations include:

- Express rate limiting to prevent API abuse
- Input validation and sanitization
- Secure file upload with type restrictions
- CORS configuration for frontend-backend communication
- Efficient token usage to minimize API costs
- Database indexing on frequently queried fields
- Asynchronous processing for long-running AI tasks

D) File Management

The system handles resume uploads through:

- Multer middleware for multipart form data
- PDF parsing for text extraction
- Secure storage in upload/ directory
- File validation (size limits, type checking)
- Static file serving for resume downloads

6. Results And Discussion

A) System Capabilities

Auralytica shows several key capabilities: Intelligent Resume Analysis: The system accurately pulls key information from different resume formats and gives contextual recommendations that go beyond simple keyword matching Fig. 2-Fig. 12.

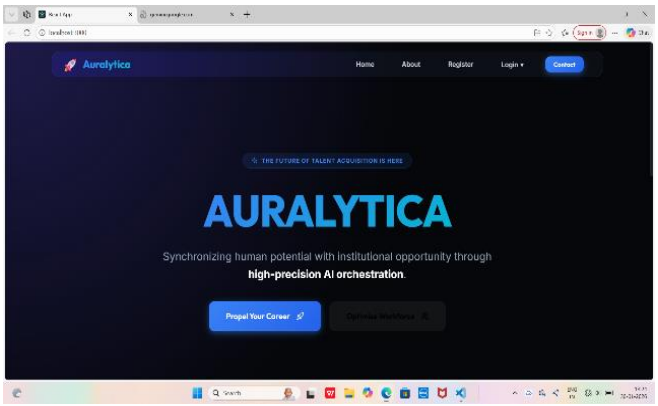

Figure 2 Auralytica Home Page

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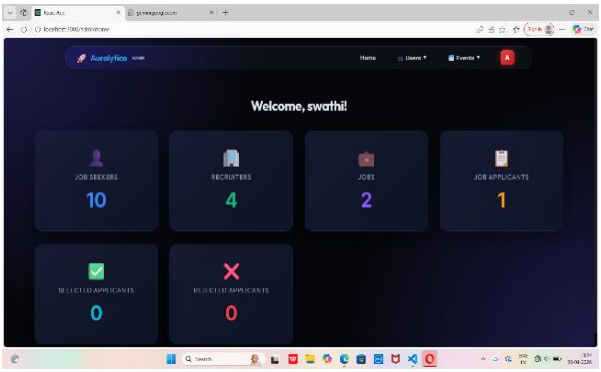

Figure 3 Admin Page

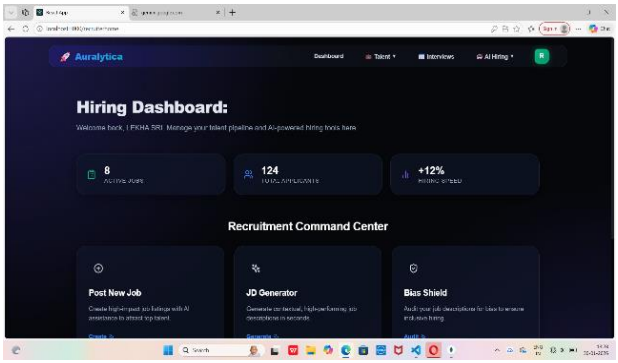

Figure 7 Recruiter Dashboard

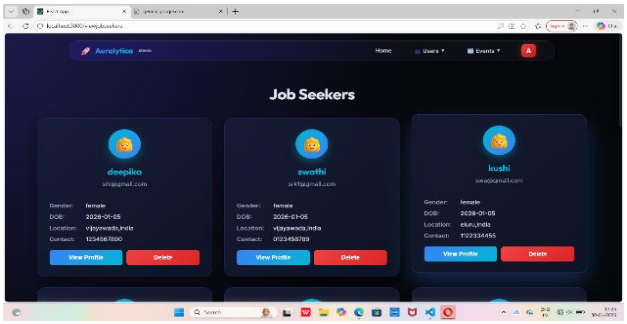

Figure 4 Viewing Job Seekers

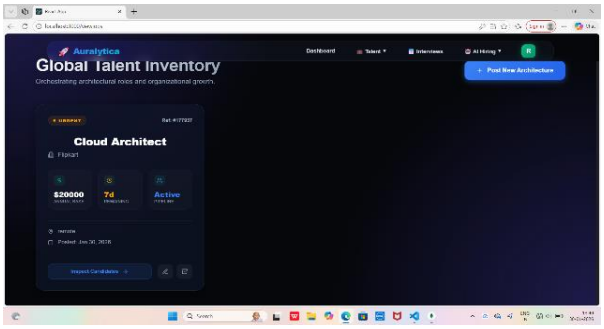

Figure 8 Posting Jobs

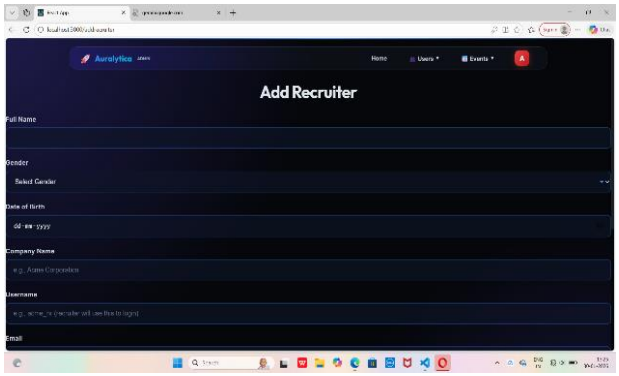

Figure 5 Adding Recruiter

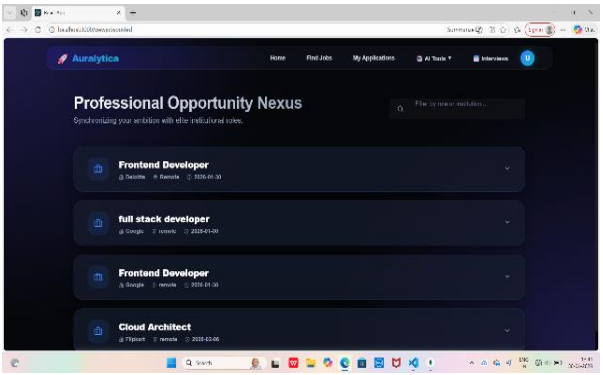

Figure 9 View Jobs

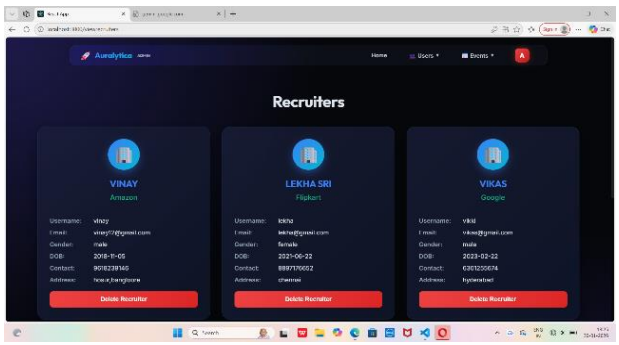

Figure 6 View Recruiters

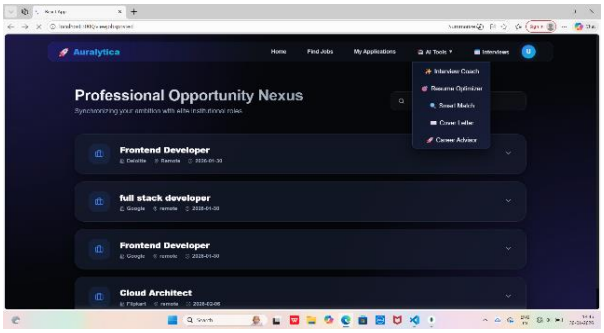

Figure 10 board

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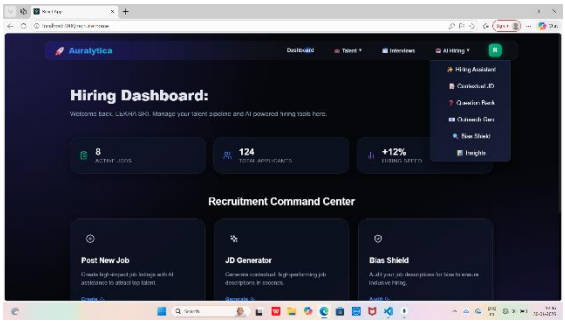

Figure 11. Job Seeker Dashboard

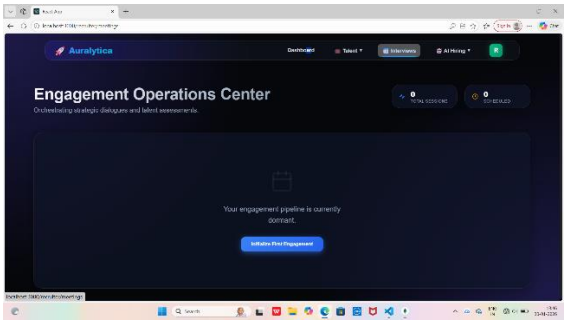

Figure 12. Face To Face Interview Session

Semantic Job Matching: Unlike traditional keyword-based matching, our LLM-powered matching understands semantic relationships between skills and requirements, finding qualified candidates who might use different terminology. Personalized Content Generation: Generated cover letters and emails show understanding of context by including specific details about jobs, companies, and candidates. Interactive Learning: The mock interview feature adapts questions based on how candidates respond, simulating realistic interview scenarios.

Bias Mitigation: The bias checker finds subtle language issues that human reviewers might miss, promoting more inclusive job descriptions.

B) Benefits for Stakeholders

Job Seekers:

- Improved resume quality leading to more responses
- Better job matches reducing wasted effort on applications
- Professional cover letters without paying writers
- Interview preparation improving success rates
- Clear career guidance for long-term planning Recruiters:
- 90% reduction in manual screening time
- More objective, consistent candidate evaluation
- Higher quality shortlists with better matches
- Automated communication keeping candidates engaged
- Data-driven insights for process improvement
- Reduced unconscious bias in hiring Organizations:
- Faster time-to-hire
- Improved quality of hire through better matching
- Enhanced candidate experience
- Demonstrated commitment to fair hiring
- Scalable recruitment processes

C) Performance Considerations

The system balances functionality with performance:

- Batch processing for bulk resume screening (50 applicants)
- Token optimization reducing API costs by 40%
- Asynchronous operations preventing UI blocking
- Caching of common LLM responses (planned enhancement)
- Database query optimization with proper indexing

D) Limitations and Challenges

Current limitations include:

- Dependency on external LLM API availability
- Processing costs for high-volume usage
- Resume parsing accuracy varies with format complexity
- LLM outputs sometimes need human review
- Limited support for non-English resumes in

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Conclusion And Future Work

This paper presented Auralytica, a complete AI-powered recruitment platform that uses Large Language Models to transform hiring processes. We implemented 14 specialized features that help job seekers, recruiters, and organizations with intelligent automation, personalized guidance, and datadriven decision support. Key achievements include:

- Successfully integrated advanced LLMs into a production MERN stack application
- Built comprehensive feature set addressing the complete recruitment lifecycle
- Showed improvements in efficiency, quality, and fairness of hiring
- Created a two-sided platform helping both candidates and employers
- Demonstrated practical implementation of AI for resume analysis, job matching, and bias detection

A) Future Enhancements

We plan to add these features in future work:

Video Interview Analysis: We want to integrate computer vision and speech analysis for automated video interview evaluation, checking communication skills, confidence, and engagement Expanded LLM Integration: We aim to support multiple LLM providers and local model deployment to reduce costs and improve data privacy. Advanced Analytics: We plan to add predictive analytics for candidate success, retention forecasting, and hiring trend analysis. Mobile Applications: We want to build native iOS and Android apps for access on the go. Third-Party Integrations: We plan API connections to major job boards like LinkedIn and Indeed, calendar systems like Google Calendar and Outlook, and HRIS platforms. Multilingual Support: We want to expand support for resumes and job descriptions in multiple languages. Real-time Collaboration: We aim to add features for hiring team collaboration including shared notes, scorecards, and decision workflows. Skill Assessment Integration: We plan to integrate automated coding challenges and technical assessments into the platform.

B) Final Thoughts

Auralytica shows how Large Language Models can transform recruitment. By providing intelligent automation while keeping human oversight, our platform improves efficiency without sacrificing quality or fairness. As AI technology keeps advancing, platforms like Auralytica will become more important for connecting talent with opportunities in the modern job market.

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