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ZeroTouch Hire

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Abstract - Traditional recruitment processes are plagued by inefficiencies, biases, and limited inclusivity, impeding effective talent acquisition. To address these challenges, we present AI Recruiter, a generative AI-powered platform that redefines hiring through advanced automation and data-driven insights. Built on Generative AI , ZeroTouch Hire features a dual-portal system for HR professionals and student candidates. HR users post job listings, triggering an AI-driven pipeline that screens resumes using keyword matching, filters candidates, and initiates fully automated interviews. These interviews, conducted via text or voice, include scenario-based, technical, and logical questions, with real-time monitoring through facial recognition, motion detection, and screen sharing to ensure integrity. Post-interview, AI generates detailed reports, scoring candidates out of 10 across knowledge, critical thinking, English proficiency, and attitude, accompanied by personalized improvement suggestions. HR receives a recommendation to guide final decisions, preserving human oversight. The student portal enables candidates to practice by uploading resumes, participating in mock interviews, and receiving actionable feedback to enhance their skills. By automating screening, interviews, and evaluations, ZeroTouch Hire reduces HR workload, mitigates biases, and promotes inclusivity, offering a scalable, equitable solution that streamlines recruitment and empowers candidates for modern workforce demands.

***Key Words*:** Artificial Intelligence , Generative AI , Recruitment, Resume Analysis, Candidate Monitoring, Feedback System, Hr Automation, Natural Language Processing, Talent Acquisition

1. INTRODUCTION

The recruitment industry faces significant challenges, including inefficiencies, human biases, and limited inclusivity, which hinder effective talent acquisition and prolong hiring cycles. Manual processes like resume screening and subjective interview evaluations often lead to inconsistent outcomes, while existing AI-based tools lack comprehensive automation and candidate-centric features. To address these issues, we introduce ZeroTouch Hire, a generative AI-powered platform that transforms recruitment through a dual-portal system for HR professionals and student candidates. Leveraging Generative AI, ZeroTouch Hire automates job posting, resume screening, and interviews with real-time monitoring via facial recognition and screen sharing, ensuring integrity and fairness. It provides detailed candidate evaluations and personalized feedback, while a student practice portal fosters skill development and inclusivity. This paper presents ZeroTouch Hire's design, implementation, and impact, offering a scalable, equitable solution to revolutionize hiring practices.

2. EXISTING SYSTEM

Traditional recruitment processes, characterized by manual resume screening and in-person interviews, are plagued by inefficiencies and biases that hinder effective talent acquisition. These methods are labour-intensive, often requiring HR professionals to shift through hundreds of applications, which delays hiring timelines. Moreover, subjective evaluations during interviews can introduce biases based on demographics, appearance, or communication styles, leading to inconsistent candidate assessments and limited inclusivity for underrepresented groups. The lack of structured feedback mechanisms further restricts candidates' ability to improve, perpetuating inequities in the hiring process. While traditional methods remain widely used, their shortcomings underscore the need for automated, data-driven solutions to streamline recruitment and enhance fairness.

Among AI-based recruitment tools, HireVue has gained prominence for its video-based interview platform, which leverages natural language processing (NLP) and facial analysis to evaluate candidates' responses and soft skills. By automating preliminary interviews, HireVue reduces HR workload and standardizes some aspects of candidate assessment. However, its reliance on facial and sentiment analysis has sparked concerns about bias, as algorithms may misinterpret cultural expressions or penalize a typical behaviours, potentially disadvantaging diverse candidates. Additionally, HireVue lacks comprehensive real-time monitoring or candidate development features, limiting its scope to early-stage screening and offering minimal support for skill enhancement. These limitations highlight the need for more inclusive and holistic AI-driven recruitment systems

Another widely adopted system, Taleo, is an Applicant Tracking System (ATS) designed to automate resume screening by matching keywords from job descriptions to candidate profiles. Taleo enhances efficiency by filtering large applicant pools, enabling HR teams to focus on shortlisted candidates. However, its keyword-based approach often overlooks contextual skills or experiences that do not align precisely with predefined criteria, potentially excluding qualified candidates. Furthermore, Taleo does not address biases embedded in job descriptions and lacks advanced interview automation or candidate feedback mechanisms. In contrast, ZeroTouch Hire integrates generative AI to automate the entire recruitment pipeline—from job posting to dynamic interviews—while incorporating real-time monitoring, facial recognition, and a student practice portal. By providing detailed evaluations and personalized feedback, ZeroTouch Hire overcomes the limitations of HireVue and Taleo, offering a scalable, equitable solution that promotes inclusivity and candidate empowerment.

3.IDEATION

The conception of ZeroTouch Hire stemmed from the recognition of persistent challenges in the recruitment industry, where inefficiencies, biases, and lack of inclusivity hinder effective talent acquisition. Observing the time-intensive nature of manual resume screening and the subjectivity in traditional interviews, we identified a critical need for a system that could automate these processes while ensuring fairness and scalability. Conversations with HR professionals revealed their frustration with repetitive tasks and the difficulty of maintaining consistent evaluation criteria across diverse candidate pools. Simultaneously, feedback from job seekers highlighted the lack of constructive guidance to improve their skills, particularly for students and underrepresented groups. These insights inspired the vision for a comprehensive, AI-driven platform that streamlines recruitment for employers and empowers candidates to succeed.

The ideation process focused on leveraging cutting-edge generative AI to address these challenges holistically. Inspired by advancements in natural language processing and real-time monitoring technologies, we conceptualized a dual-portal system tailored to the needs of HR professionals and student candidates. For HR, the goal was to automate the entire recruitment pipeline—from job posting to candidate evaluation—while preserving human discretion in final decisions. For candidates, we envisioned a practice module to simulate real interviews and provide actionable feedback, fostering skill development and inclusivity. The integration of Generative AI emerged as a natural choice to generate dynamic, context-aware interview questions and evaluate responses across technical and soft skills. Additionally, the inclusion of facial recognition and motion detection was proposed to ensure interview integrity, addressing concerns about cheating in virtual settings while prioritizing ethical implementation to mitigate privacy risks.

Central to the ideation was the commitment to creating an equitable and candidate-centric recruitment ecosystem. Unlike existing systems that prioritize employer efficiency, ZeroTouch Hire was designed to balance the needs of both stakeholders. The concept of automated resume screening with keyword matching was refined to minimize biases by focusing on skills and qualifications rather than demographic indicators. The student practice portal was envisioned as a transformative feature, enabling candidates to gain confidence and refine their profiles before entering the job market. By combining automation, real-time monitoring, and personalized feedback, AI Recruiter was conceptualized as a scalable solution that not only streamlines hiring but also redefines recruitment as an inclusive, empowering process for modern workforce demands.

4.SYSTEM ARCHITECTURE

The architecture of ZeroTouch Hire, depicted in Figure 1, comprises three layers:

- Input Layer: HR users upload job descriptions, and candidates submit resumes in PDF/DOCX formats via the HR or student portal.
- Processing Layer: Tesseract OCR extracts keywords (e.g., skills, experience) from resumes, matched against job requirements. A generative AI LLM (e.g., Llama) generates dynamic interview questions and evaluates responses across knowledge, critical thinking, English proficiency, and attitude. Real-time monitoring uses facial recognition and motion detection to ensure integrity.
- Output Layer: Structured reports score candidates (0–10) and provide improvement suggestions. HR receives recommendations, while candidates access feedback via the student portal.

Figure 1: ZeroTouch Hire System Architecture [Description: A flowchart with three layers. The Input Layer accepts job descriptions and resumes. The Processing Layer uses Tesseract for keyword extraction, LLM for interview generation/evaluation, and monitoring tools. The Output Layer delivers candidate reports and feedback. Arrows show data flow from input to output.]

The modular architecture supports alternative OCR/LLM models and includes error handling for malformed inputs, ensuring scalability and robustness.

5.METHODOLOGY

5.1 System Design ZeroTouch Hire integrates:

- Resume Screening: Tesseract extracts keywords using predefined taxonomies, ignoring demographic data to reduce bias.
- Automated Interviews: The LLM generates scenario-based, technical, and logical questions, delivered via text or voice. Responses are scored using NLP.

- Monitoring: Facial recognition and motion detection verify candidate identity and detect irregularities, with screen sharing for technical assessments.
- Report Generation: The LLM produces reports scoring candidates on four metrics, with personalized feedback.
- Student Portal: Candidates upload resumes, practice interviews, and receive feedback to improve skills.

5.2 Data The system was tested on 1,500 anonymized resumes from technology, healthcare, and finance sectors, in PDF formats. Fifty job descriptions defined keyword taxonomies. Mock interviews were conducted with 100 student volunteers to evaluate the practice portal.

5.3 Implementation

- Tesseract 5.3.0 processed resumes with preprocessing (e.g., noise reduction) to enhance accuracy.
- An open-source LLM was fine-tuned on HR datasets to generate questions and reports.
- Facial recognition used OpenCV, and motion detection employed frame differencing, ensuring ethical data handling.
- The student portal was built with a web interface, allowing resume uploads and mock interviews.

5.4 Evaluation Metrics

- Time-to-Hire: Time from job posting to report generation.
- Keyword Extraction Accuracy: Precision, recall, F1-score against ground truth.
- Interview Scoring Accuracy: Correlation between AI scores and human ratings.
- Report Quality: Human expert ratings (1–5) for clarity, relevance, completeness.
- User Satisfaction: Survey scores (1–5) from HR and candidates.

6.RESULTS

Testing on 1,500 resumes and 100 mock interviews yielded:

- Time-to-Hire: Reduced by 65% (from 12 days to 4.2 days) compared to manual processes.
- Keyword Extraction: Precision: 94%, Recall: 90%, F1-score: 92%, handling diverse formats effectively.
- Interview Scoring: AI scores correlated strongly (r=0.88) with human ratings across four metrics.
- Report Quality: Average rating of 4.3/5, with high scores for relevance (4.6/5) and clarity (4.4/5).
- User Satisfaction: HR users rated 4.5/5 for workload reduction; candidates rated 4.2/5 for feedback usefulness.

Qualitatively, HR users praised the platform's automation and report detail, reducing decision-making time. Candidates valued the student portal's feedback, with 85% reporting improved interview skills. Minor issues included Tesseract errors with low-quality scans and occasional LLM misinterpretations of nuanced responses.

7.ACCURACY

Accuracy was assessed across key components:

- Keyword Extraction: Achieved 92% F1-score, with errors in handwritten or poorly scanned resumes (5% of cases). Preprocessing improved performance by 10%.
- Interview Scoring: AI scores aligned with human ratings (r=0.88), with slight discrepancies in attitude assessment due to cultural nuances (3% variance).
- Monitoring: Facial recognition achieved 98% accuracy in identity verification; motion detection flagged 95% of irregularities (e.g., unauthorized assistance).
- Report Generation: 90% of reports accurately reflected candidate performance, with minor errors in feedback specificity for highly technical roles.

Bias mitigation was effective, with standardized keyword matching reducing demographic-based errors by 15% compared to traditional ATS. Continuous LLM fine-tuning minimized response misinterpretations.

8.DISCUSSION

ZeroTouch Hire outperforms existing systems by automating the entire recruitment pipeline, achieving a 65% time-to-hire reduction and 92% keyword accuracy. Tesseract's robust OCR and the LLM's dynamic question generation enable precise evaluations, while real-time monitoring ensures integrity. The student portal fosters inclusivity, addressing gaps in tools like Taleo [2]. Bias mitigation through standardized screening enhances fairness, aligning with ethical AI principles [3].

Limitations include Tesseract's errors with low-quality documents and LLM's occasional misinterpretation of cultural nuances. Future enhancements will incorporate advanced OCR (e.g., Google Vision) and multilingual LLMs to support diverse candidate pools. Integration with enterprise HR systems and enhanced bias detection will further refine the platform.

9.CONCLUSIONS

Zero Touch Hire represents a transformative advancement in recruitment technology, addressing the inefficiencies, biases, and inclusivity challenges of traditional hiring processes through a generative AI-powered, dual-portal platform. By automating job posting, resume screening, and dynamic interviews with real-time monitoring, it significantly reduces HR workload while ensuring fair, data-driven candidate evaluations. The student practice portal empowers candidates with personalized feedback, fostering skill development and promoting equitable access to opportunities. Experimental results demonstrate the platform's efficiency, accuracy, and user satisfaction, positioning it as a scalable solution for modern workforce demands. Future work will explore multilingual support, integration with enterprise HR systems, and enhanced bias detection to further

refine the platform's inclusivity and applicability, paving the way for a more equitable and efficient recruitment ecosystem.

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