

# Transforming Talent Acquisition: A Scalable AI Recruitment Platform for Comprehensive, Multi-Modal Candidate Assessment



## Client Overview

A globally operating recruitment services provider with over 100 employees, servicing clients across technology, healthcare, BFSI, and manufacturing sectors. The client handles the screening and placement of thousands of candidates annually. They sought a solution to digitize and streamline early-stage candidate evaluations—particularly for technical and functional roles—without compromising quality or fairness.

## What Client Needed

To develop an AI-driven interview automation platform capable of:

- ✓ Automating resume-to-job-description (JD) matching using advanced NLP techniques.
- ✓ Generating dynamic, role-specific interview questions based on extracted candidate skills and JD alignment.
- ✓ Conducting AI-led asynchronous video interviews with realistic, human-like interactions.
- ✓ Evaluating candidate responses using multimodal AI models (speech, text, sentiment, and confidence analysis).
- ✓ Providing recruiters with a structured ranking dashboard for data-driven decision-making.



## Tech Stack

<b>AI Orchestration &amp; RAG</b> LangChain, Haystack	<b>Generative Models</b> GPT-4, Fine-tuned Mistral-7B	<b>Speech Processing</b> OpenAI Whisper (STT), ElevenLabs TTS	<b>Lip-Sync AI</b> Wav2Lip, Rhubarb Lip Sync
<b>Sentiment Analysis</b> OpenSMILE, DeepFace, HuggingFace Transformers	<b>Bias Detection</b> IBM AI Fairness 360, Custom ML Heuristics	<b>Analytics &amp; Dashboard</b> Power BI, Streamlit, Elasticsearch	

## Business Challenges

The client faced significant hurdles in scaling their recruitment process:

<p><b>Overwhelming Applicant Volume</b></p> <p>Recruiters struggled to process thousands of CVs, leading to delays and inconsistent screening outcomes. The system needed to handle concurrent interviews with low-latency response processing.</p>	<p><b>Dynamic Question Generation &amp; Context Retention</b></p> <p>Generic questions led to poor candidate assessment; follow-up questions required contextual understanding. The AI needed Retrieval-Augmented Generation (RAG) to pull relevant domain knowledge and generate adaptive follow-ups.</p>	<p><b>Realistic AI Interviewer Interaction</b></p> <p>Robotic text-to-speech (TTS) voices reduced candidate engagement. Integrating emotion-aware TTS (ElevenLabs) and lip-sync AI (Wav2Lip) for natural interactions.</p>
<p><b>Bias Mitigation &amp; Fair Scoring</b></p> <p>Human biases and inconsistent scoring affected hiring fairness. Implementing bias-detection algorithms and normalized scoring models to ensure objectivity.</p>	<p><b>Multimodal Response Evaluation</b></p> <p>Evaluating candidates solely on text responses ignored vocal confidence, sentiment, and non-verbal cues. The solution must address it by deploying speech emotion recognition (SER) models alongside transformer-based answer scoring.</p>	

## What We Offered

DRC Systems engineered a robust AI Interview Automation Platform, leveraging cutting-edge AI, NLP, and video analytics to streamline candidate screening. The solution was designed with modularity and scalability in mind, addressing both technical and operational challenges.

### AI-Driven Resume-JD Matching & Question Generation

- NLP-Powered Parsing by using spaCy and BERT-based embeddings for entity extraction (skills, experience, education).
- Cosine similarity + Knowledge Graph alignment to match resumes with JDs.
- Dynamic Question Generation by leveraging GPT-4 with RAG to pull industry-specific question templates.
- Generated adaptive follow-up questions based on candidate responses.

### AI-Conducted Video Interviews

- Leveraged ElevenLabs TTS for natural speech modulation.
- Integrated LipSync AI for synchronized lip movements.
- Candidates answered pre-recorded AI questions with timed responses.
- Real-time speech interruption handling for seamless interaction.

### Automated Multimodal Evaluation

- Leveraged Open AI Whisper (STT) for transcription and RoBERTa-based scoring for answer relevance for effective speech and text analysis.
- Integrated OpenSMILE + CNN models for vocal tone analysis and Facial emotion recognition (FER) via DeepFace for detailed sentiment and confidence analysis.

### Composite AI Scoring

- Weighted scoring model combining technical accuracy (50%), confidence (20%), sentiment (15%), engagement (15%) to foster unbiased and fair recruitment practices.

### Recruiter Dashboard & Explainable AI (XAI)

- Developed a centralized dashboard with Streamlit/Power BI integration for recruiter analytics.
- SHAP (SHapley Additive exPlanations) for transparency in AI scoring.

## Business Benefits and Impact

- 01 Faster Screening**  
Reduced screening time by up to 70% per candidate
- 02 Improved Shortlisting**  
40% improvement in accuracy of candidate-job fit
- 03 Scalability**  
Simultaneously handled 500+ asynchronous interviews daily
- 04 Consistency & Fairness**  
Bias-free, uniform evaluation with structured scoring
- 05 Recruiter Focus**  
Human recruiters only reviewed top-tier candidates

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