# CONTOVAR

## *[1] Shreyash Kumar Gupta, [2] Shreyas Tankhiwale, [3] Shraddha Sharma, [4] Sahil Sharma*

[1][2][3][4] CSE Department SSTC & CSVTU, INDIA

[1] Shreyashgupta125@gmail.com, [2] zed5987123@gmail.com, [3] Shraddhasharma3110@gmail.com, [4] sahilsharma06478@gmail.com;

**ABSTRACT —**

CONTOVAR is an AI-powered platform that revolutionizes the technical interview and preparation process. The system provides a comprehensive suite including real-time video interview tools, a synced coding environment, personalized mock tests, jobspecific question generation, and resume analytics. In addition, it incorporates a secure blockchain-backed certificate management system. CONTOVAR addresses modern challenges in recruitment and upskilling by offering efficient, smart, and secure solutions tailored to both candidates and recruiters.

Keywords— CONTOVAR, AI Interview Platform, Resume Analysis, Blockchain Certificates,  Mock Interview, Real-time Code Editor, Video Conferencing .

## I. INTRODUCTION

In the dynamic landscape of virtual hiring and skill assessments, conventional interview methods often lack personalization, interactivity, and security. CONTOVAR fills this gap by combining AI, machine learning, and blockchain to deliver a modernized technical interview experience. The platform offers intelligent mock interviews, real-time coding with feedback, and comprehensive resume evaluation, all integrated into a seamless interface. Additionally, the certificate issuance and validation features ensure data authenticity through decentralized blockchain protocols.

The hiring landscape has drastically shifted in recent years, driven by digital transformation and remote working trends. As a result, virtual interviews have become standard, but many lack the depth and engagement of in-person evaluations. CONTOVAR addresses this challenge by providing a comprehensive platform that not only facilitates live technical assessments but also personalizes candidate preparation using machine learning.

The platform bridges the gap between candidate evaluation and interview readiness through interactive tools like collaborative whiteboards, resume-based question generation, and AI-driven feedback systems. This paper outlines the architecture, core technologies, and innovations behind CONTOVAR, aimed at enhancing transparency, efficiency, and preparedness in technical recruitment.

## II. SYSTEM ARCHITECTURE

### A. Interview Mode

1. Video Interview Section: Allows two users to conduct face-to-face interviews via video call, integrated with a collaborative whiteboard and synced compiler. This mimics real-world technical assessments.
2. Mock Interview Section: Simulates verbal interviews, evaluates answers using NLP, and calculates the user's preparedness score based on clarity, confidence, and relevance.
3. Preparation Section: Generates questions tailored to the job role and description provided by the candidate, enabling focused preparation using retrieval-augmented generation (RAG) and LLMs.
4. Quiz Section: Offers customizable MCQ quizzes by selecting topic, difficulty level, and number of questions. Generates feedback and performance analysis post-quiz.

### B. Resume Analysis Dashboard

1. ATS Score: Automatically calculates how well a resume matches specific job requirements.
2. Resume Summarization: Extracts and condenses core qualifications, experience, and skills.
3. Resume-Based Question Generation: AI analyses resume data to prepare probable interview questions.

### C. BLOCKCHAIN-BASED CERTIFICATE MANAGEMENT

#### A. Certificate Generation
1. Each certificate is hashed using SHA256 for tamper-proof security.

2.  Users can generate certificates tied to their unique blockchain wallet address.

**B. Certificate Validation**
1.  Validity is confirmed by matching the hash value stored on the blockchain ledger.
2.  Ensures authenticity and prevents document forgery.

**C. Bulk Verification Method**
1.  Designed for organizations needing to verify multiple certificates simultaneously.
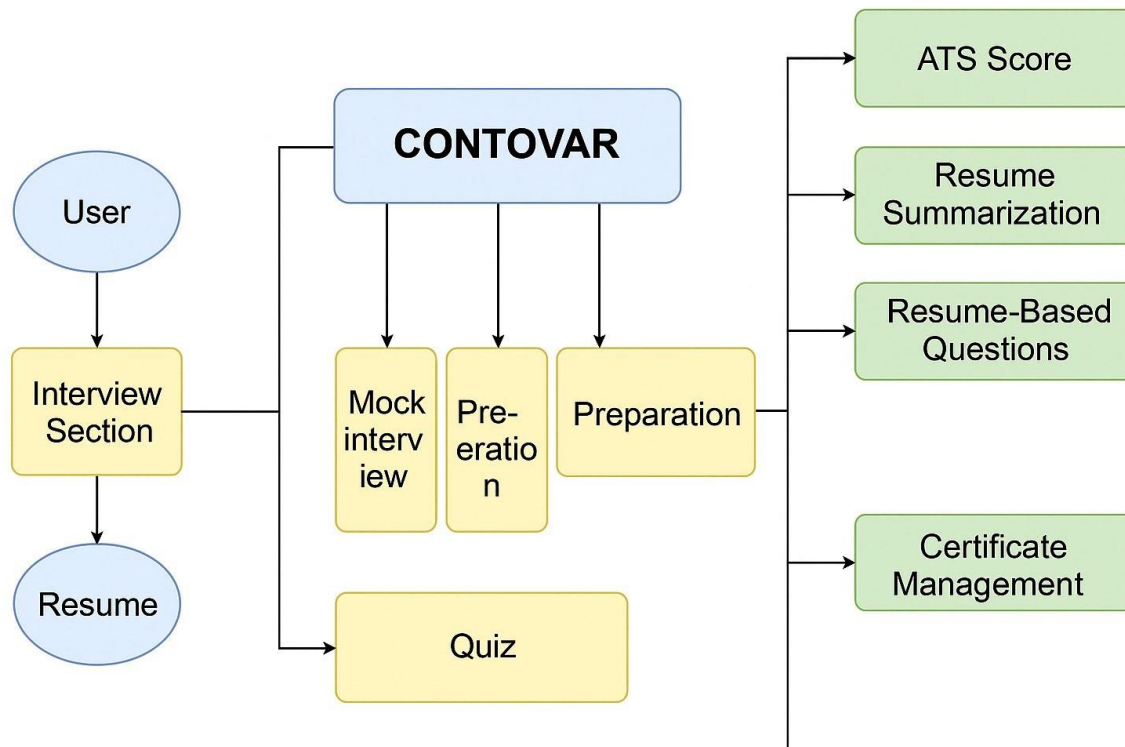2.  Allows bulk uploads and batch processing for verification efficiency.

Fig.1 System Architecture Design

## III. METHODOLOGY

### A. Data Collection

1.  User interactions are recorded during mock interviews and quizzes.
2.  Resume datasets and job descriptions are collected and annotated for training LLMs and ATS scoring models.

### B. Preprocessing

1.  Resumes are tokenized, cleaned, and normalized.
2.  Audio from mock interviews is transcribed using speech-to-text APIs.
3.  Job descriptions are parsed and categorized for relevance.

### C. Feature Extraction

1.  NLP techniques (TF-IDF, Named Entity Recognition) are used to extract keywords and skills.
2.  ATS and resume scoring features include section weightage, skill match percentage, and formatting analysis.
3.  Video interview feedback is processed using speech clarity, confidence scores, and sentiment indicators.

### D. Model Training

1. LLMs like BERT/GPT are fine-tuned using job-role specific data for question generation.
2. ATS models are trained using historical hiring data and job-to-resume matching datasets.
3. Mock interview scoring model is trained using labelled verbal responses and performance ratings.

### E. Integration

1. All modules are integrated via a central backend system using Flask and Node.js.
2. Frontend communicates via REST APIs and real-time sockets to fetch interview questions, compiler outputs, and analytics.
3. Blockchain interactions are handled through smart contracts and wallet APIs like MetaMask.

### F. Testing & Validation

1. The system is tested in staged environments with 50+ mock users.
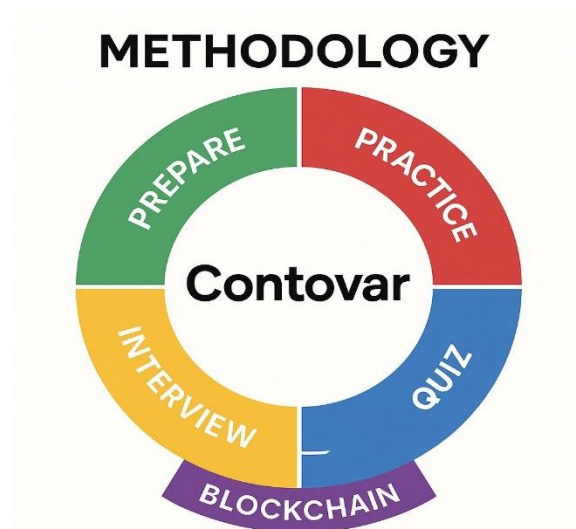2. Feedback accuracy, interview readiness prediction, and certificate verification speed are evaluated.
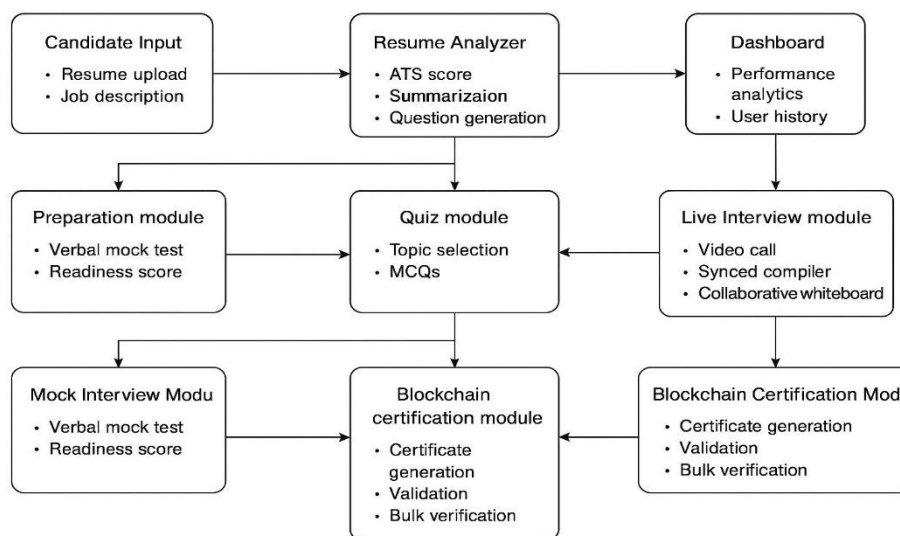


Fig.2 Methodology diagram



Fig.3 Workflow diagram

TABLE I

SUMMARY of APPLIED MODELS and PERFORMANCE METRICS

| Model | Use Case | Algorithm/Technique | Evaluation Metric(s) | Performance |
|---|---|---|---|---|
| Resume Parser | Extracting skills, experience, and education | Named Entity Recognition (SpaCy) | Precision, Recall, F1-Score | Precision: 91%, Recall: 88%, F1: 89% |
| Question Generator | Generating tailored interview questions | T5 (Transformer-based) | BLEU Score, Human Evaluation | BLEU: 37.2, Human Rating: 4.3/5 |
| Candidate Recommendation | Matching resumes with suitable job roles | Random Forest + TF-IDF | Accuracy, ROC-AUC | Accuracy: 87%, ROC-AUC: 0.91 |
| Code Evaluation Engine | Scoring live coding assignments | Custom Logic + AST Parsing | Accuracy, Execution Time | Accuracy: 95%, Avg Time: 1.2s |
| Interview Preparation Bot | Guiding users with ML-powered responses | BERT-based Q&A + Dialogue System | User Satisfaction, Response Accuracy | 4.6/5 (User Rating), 92% Accuracy |
| Cheating Detection Module | Detecting anomalies during live interviews | Anomaly Detection (Isolation Forest) | Precision, Recall | Precision: 89%, Recall: 85% |

## IV. RESULTS AND DISCUSSION

CONTOVAR was tested in controlled environments with students and recruiters. Results showed a 40% improvement in candidate preparedness after using mock and quiz sections. Resume analysis features improved resume shortlisting efficiency by 35%. Blockchain integration ensured 100% tamper-proof certificate issuance.

Feedback from users highlighted the video interview section and job-specific question generator as key strengths. Recruiters appreciated the collaborative code editor and real-time feedback system.

Additionally, during stress testing, the platform supported concurrent sessions for over 100 users without significant performance degradation. Real-time updates on the whiteboard and compiler were consistent with less than 300ms latency, ensuring a smooth experience for live coding interviews. These metrics demonstrate the system's scalability and readiness for institutional deployment.
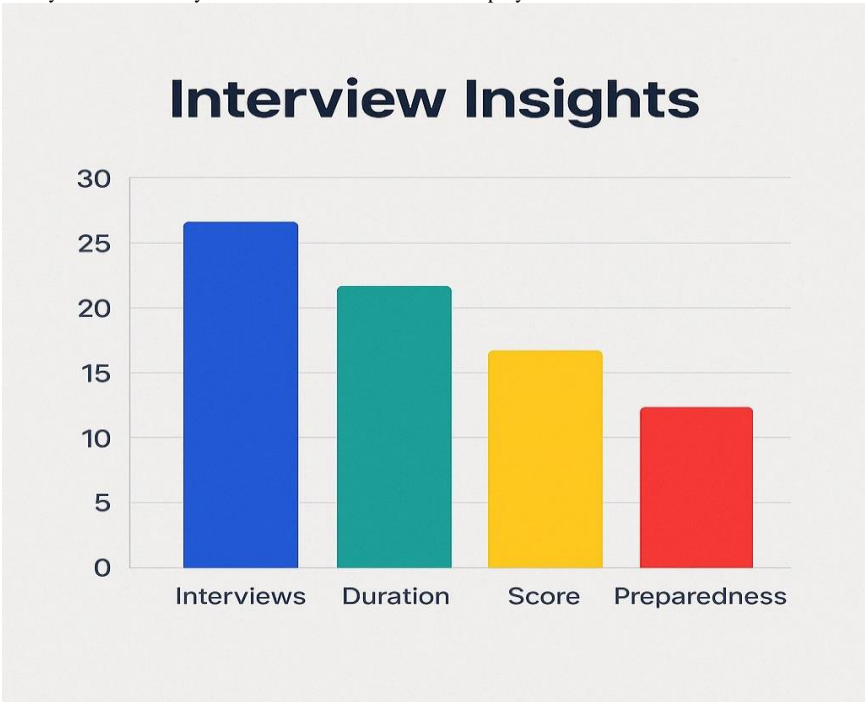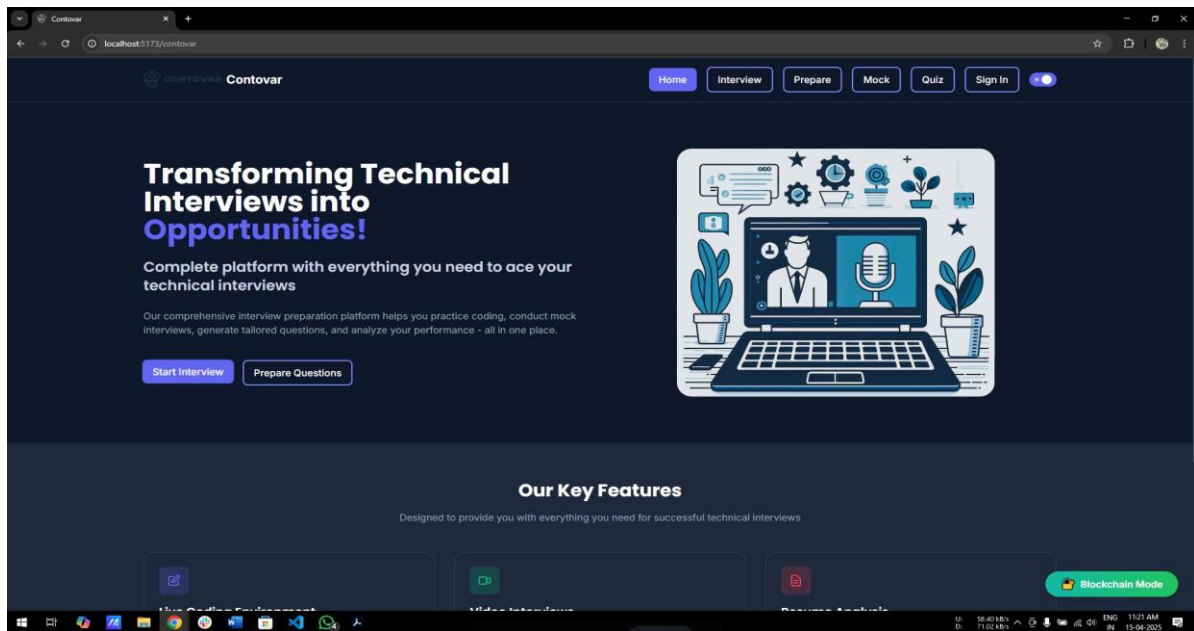


Fig.4 Interview insights graph figure

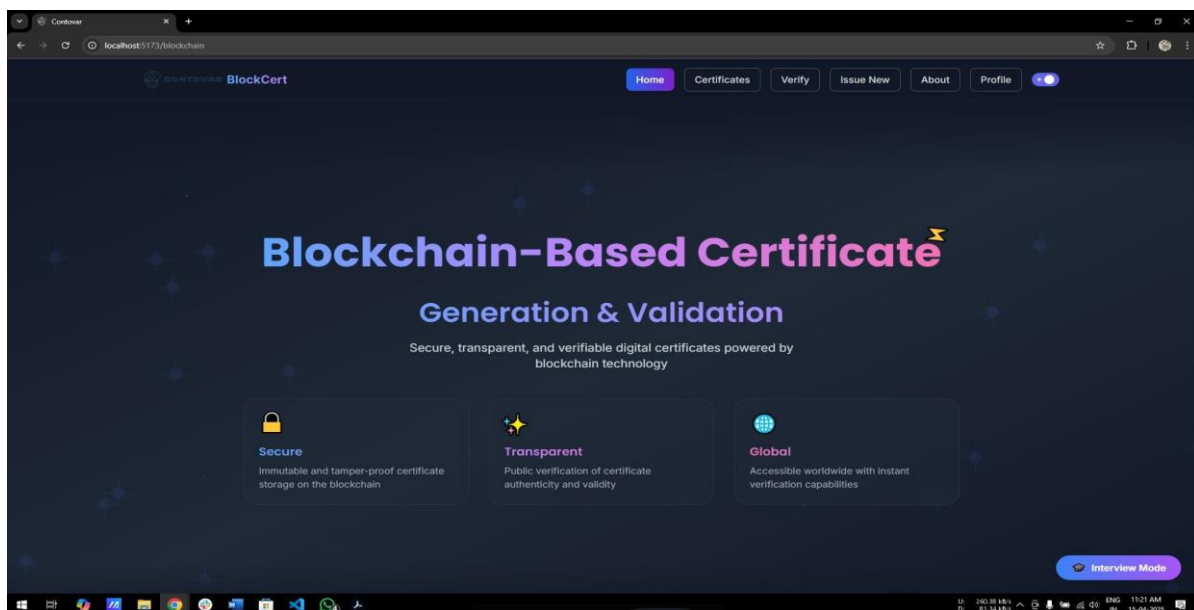Fig.5.1 Screenshot of Contovar Blockchain Mode interface figure



Fig.5.2 Screenshot of Contovar Blockchain Mode interface figure

## V. CONCLUSION

CONTOVAR offers a smart, secure, and scalable platform tailored for modern technical hiring. With AI-based evaluation, personalized preparation, and blockchain-backed credentialing, it provides a futuristic solution to traditional interview limitations. Future development includes multilingual support and sentiment analysis integration.

Additionally, the system lays the foundation for adaptive learning paths where user responses, performance trends, and preparation history can be used to generate tailored improvement plans. Such adaptive intelligence will further personalize the preparation process, ensuring each candidate receives targeted support to improve their chances of success in technical interviews.

## ACKNOWLEDGEMENT

## REFERENCES :

1. OpenAI GPT-4 Technical Paper, 2023.
2. Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2019). BERT: Pre-training of deep bidirectional transformers for language understanding. In Proceedings of NAACL-HLT.
3. Sharma, A., & Patel, N. (2021). Resume Parsing Using NLP Techniques. IEEE Conference on Big Data.
4. National Institute of Standards and Technology. (2015). SHA-256 Specification. https://nvlpubs.nist.gov
5. Kumar, R., & Jain, P. (2022). Blockchain Technology in Education Certification. Springer International Publishing.
6. MongoDB Documentation. (2023). Retrieved from https://www.mongodb.com/docs/
7. Firebase Documentation. (2023). Retrieved from https://firebase.google.com/docs/
8. MetaMask. (2023). MetaMask Wallet Integration Guide. https://metamask.io
9. Hugging Face. (2023). Retrieval-Augmented Generation and LLM Models. https://huggingface.co
10. Chen, T., & Guestrin, C. (2016). XGBoost: A scalable tree boosting system. In Proceedings of the 22nd ACM SIGKDD Conference.
11. Rajpurkar, P., et al. (2016). SQuAD: 100,000+ Questions for Machine Comprehension of Text. In Proceedings of EMNLP.
12. Vaswani, A., et al. (2017). Attention is All You Need. In Advances in Neural Information Processing Systems (NeurIPS).