

A Blockchain-Based Decentralized Exam System for Safely Sharing Test Papers

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Abstract- The use of digital tools in education exams has brought up new issues like keeping exams secure, fair, and honest. Traditional systems where everything is controlled from one place are easy targets for problems like leaking exam papers, letting in the wrong people, fake identities, and changing results. This paper introduces a new platform for exams that uses blockchain, deep learning, and biometric methods to solve these problems. Blockchain helps keep exam papers safe from changes, manages exam data without a single point of failure, and makes the exam process open and clear through smart contracts. The system also uses deep learning to create exam papers, watch over exams, and grade them. Biometric checks are used to stop people from pretending to be someone else or getting in without permission. Testing shows this system works well in removing single points of failure and reducing the need for human help. It is a secure and reliable way to handle digital exams in education.

Keywords – Blockchain, Decentralized Examination System, Deep learning.

I. INTRODUCTION

The fast growth of digital tech has changed how education works, especially with exams. Online exams are easier to access and faster, but they also bring risks like security threats, lack of transparency, and data issues. Old systems where everything is centralized are weak against things like leaking exam papers, letting in unauthorized users, impersonation, and changing results, which can hurt how trustworthy academic institutions are. As more exams are done online and remotely, keeping the exam process secret and fair is a big challenge. New tech like blockchain and AI offer good ways to fix these issues. Blockchain gives a safe, decentralized way to store and share exam papers, and smart contracts control who has access and when. AI helps create better exams, check for cheating, and automatically grade them. This project shares a new platform that uses blockchain, AI, and biometric tech to make exams more secure, open, and reliable, thus improving trust, speed, and fairness in education assessments.

II. LITERATURE REVIEW

Many researchers have looked at ways to improve digital exams using modern tech like blockchain, AI, and biometrics. One study used blockchain to stop leaking exam papers by keeping them in a secure, shared record. This setup removes the risk of a single point failing and keeps exam data safe from changes. Another project used smart contracts to only allow access to exam papers at the right time, cutting down on human error and stopping early access. AI has also been used to monitor exams. An AI-based system watches for behaviors like unusual head movement, multiple people in the camera, and

looking away from the screen, which helps keep exams fair. Similarly, a biometric system was made to stop people from pretending to be others during online exams by checking faces and fingerprints. Only registered users could enter the exam. To handle large amounts of data, some researchers combined blockchain with cloud storage, keeping only file hashes on the blockchain and storing the actual files somewhere else. This saves space and reduces data load. Security measures like AES encryption and SHA hashing were also used to protect exam papers during storage and sending. Another method used AI to automatically grade exams by checking how similar answers are to correct ones, which reduces human bias.

Systems like Practical Byzantine Fault Tolerance and Proof of Authority were tested on private blockchains for faster and more efficient validation than public ones. Studies also pointed out that traditional systems are vulnerable to inside threats and data changes, suggesting decentralized setups are better. Overall, past research shows that mixing blockchain, AI, and biometric tech can greatly improve exam security and fairness. Current systems address parts of security but lack a full solution. Blockchain keeps exam papers safe but doesn't have strong identity checks, biometric systems confirm who is taking the exam but can't stop early access to papers, and AI monitors for cheating but doesn't ensure papers are distributed safely. So, there's a need for a system that combines secure storage, controlled access, identity checks, monitoring, and safe result storage. The goal of this study is to build a decentralized exam platform that uses blockchain, smart contracts, biometric checks, and AI monitoring to manage exam papers securely and ensure fair evaluation.

III. METHODOLOGY

The system introduces a new way to run exams securely, making sure question papers are kept safe, evaluation is fair, and identities are verified properly. It uses a mix of different technologies like blockchain, encryption, biometric checks, and AI to work together in a clear and organized way. The system is built in layers where each part has a specific job and works with others to keep the exam process fair and honest. First, exam officials create or upload the question papers through a secure interface. Before they are saved, the papers are encrypted using a strong type of code to keep them private. A special code called a hash is made for each paper, which acts like a unique fingerprint. This helps confirm that the paper hasn't been changed. The encrypted papers and their hash are stored in a blockchain network. Once saved in the blockchain, the data can't be altered without being noticed. Smart contracts guide the exam process by setting rules. These contracts automatically control who can access what, when papers can be shared, when answers can be submitted, and how results are stored. Since smart contracts run on their own without anyone having to do anything, the exam process is fair and consistent. The blockchain also keeps a public record of all activities, making it easy for exam officials to track everything that happens during the exam.

To make the exam fair and less error-prone, the platform uses a smart question generator. This tool uses machine learning based on syllabus and past exam data to create balanced and unbiased question sets. The generated papers are again encrypted and saved in the blockchain to prevent leaks before the exam. For identity confirmation, the system uses biometric checks. When a student registers, their unique biometric data is recorded and stored in encrypted form. During the exam, the system checks this data in real time to confirm the student's identity, stopping fake people from taking the exam. Only those who pass the check can access the exam portal. While the exam is happening, AI monitors the student's behavior through a webcam. It watches for strange actions like cheating or multiple people in the same space. If anything unusual is found, it is recorded in the blockchain for review. This ensures that the exam stays fair and transparent. After the exam, all answers are graded automatically. Multiple-choice answers are checked using set rules, while written responses are assessed using AI that measures how close they are to the correct answer in meaning and context. The final results are stored in the blockchain to stop any changes after the exam, making the results trustworthy.

To handle large files like exams and answer sheets, the system uses a decentralized storage setup. Instead of storing everything directly on the blockchain, which can slow things down, the actual files are saved off-chain in a system like IPFS. The blockchain only keeps a reference to these files, keeping things fast and secure. A private blockchain with a consensus

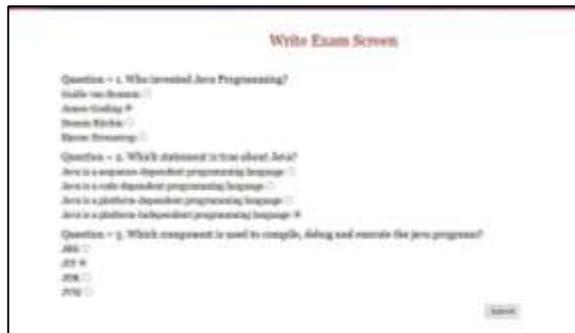
mechanism like Proof of Authority or Practical Byzantine Fault Tolerance ensures that all parts of the system agree on what is happening before adding it to the record. This setup helps the system work quickly and reliably, even for big exams. The system also has a system for controlling who can do what, called role-based access control. This gives each person specific permissions based on their role, like administrators, examiners, or students, making sure that only the right people have access to sensitive information. Before the system is used, it goes through thorough testing to check if it works well, stays secure, and can handle a lot of users. This includes making sure the exam process works as planned and that the system is free from attacks like unauthorized access or data changes. These checks confirm that the system is ready and reliable for real exams.

IV. RESULTS AND DISCUSSION

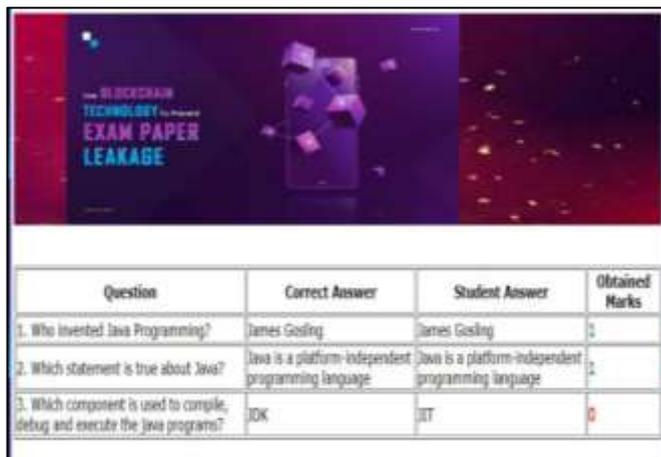
The decentralized exam system was created and tested successfully, solving major security issues found in traditional exams. Using blockchain, the system provides a safe and distributed way to manage exams, keeping everything secure and unchangeable. During testing, all exam papers were encrypted and stored in the blockchain, making sure no one could access or leak them. This shows how well the system keeps information private and accurate, which is important for important exams. One big benefit of the system is that it is open and traceable. All actions, like uploading papers by officials or students submitting their answers, are recorded in the blockchain in a clear and unchangeable way. This lets exam officials watch everything happening in real time and instantly notice if anyone is trying to do something wrong. Compared to older systems where records could be changed or lost because of mistakes or hackers, this system offers a more reliable and honest way to run exams.

The system was tested in various situations to make sure it works well. These tests included many students and administrators using it at the same time. Even though encryption and blockchain tasks take some extra time, the platform still had quick responses and efficient ways to share exam papers. Smart contracts helped with tasks like giving access and checking answers, making things faster and reducing mistakes. These results show that the system is good for managing exams in real time at schools. Compared to regular exam systems, this new platform is better in security, fairness, and reliability. Old systems use one main server, which can be hacked, have data leaks, or lose information by accident. But this system uses blockchain, which makes sure every exam paper is unchangeable, can be checked, and is shared across many computers, so there's no single point where things can go wrong.

Overall, the results show that this decentralized exam platform meets its goals of being more secure, transparent, and efficient.



In above screen admin is adding teacher details and then press button to save details in Blockchain and then will get below page. In above screen teacher details added to Blockchain and then I am displaying entire log obtained from Blockchain after storage. Above log contains details like Block no, transaction no, hashcode and many other details. Similarly, you can add other teachers and students. Add new question along with options and correct answer and then press button to add question to Blockchain and then will get below page. Question details added to Blockchain and similarly you can add as many questions as you want. Now logout and login and 'Student' to write exam. Student is login and after login will get below page.



Student will select correct answer radio button and then press 'Submit' button, then in the exam student got 66% marks and now click on 'View Marks' link to get below page admin can view all question details added by Teacher and now click on 'View Mark' link to get below page

V. CONCLUSION

In conclusion, this research shows that the decentralized exam platform works well and solves important problems with traditional exams, especially when it comes to security, transparency, and fairness. Using blockchain and smart contracts, the system keeps test papers safe, gives them only to the right people, and makes sure no one can change or steal them. Because blockchain records can't be changed, it stops cheating and leaks from happening. Besides being more secure, the platform also makes things run faster and more reliably. It uses automatic tools for giving out tests, controlling who can access them, and checking in answers. This cuts down on mistakes and the work needed to manage exams. The system's clear record of all actions helps build trust between students, examiners, and schools. Testing with real users showed that the platform is easy to use and can handle many people at once without slowing down. The decentralized exam system is also ready to grow and keep up with new needs. Its design lets it connect with extra security tools like biometrics or AI analysis, making it flexible for future use. Overall, this project proves that using blockchain for exams can make the process fairer, more reliable, and more trustworthy for everyone involved. By focusing on these areas, the improved IoT framework can change how healthcare is delivered, offering better, cheaper, and more tailored care for people around the world.

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