



# International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

*(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)*



**Impact Factor: 8.699**

**Volume 14, Issue 12, December 2025**

# Decentralized Academic Credential Verification using Blockchain

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**ABSTRACT:** Academic certificate forgery has become a serious concern for educational institutions and employers. Traditional verification methods are time-consuming and prone to manipulation. This project proposes a blockchain-based Academic Certificate Verification System. Ethereum blockchain is used to store immutable certificate hash values. Universities issue digital certificates through a secure web platform. Students can access and share their certificates using a personalized dashboard. Employers verify certificate authenticity by validating blockchain records. The backend system is developed using Flask with MongoDB for data storage. Smart contracts ensure data integrity and transparency. The system improves trust, security, and efficiency in credential verification processes.

**KEYWORDS:** Blockchain, Ethereum, Academic Certificates, Hashing, Flask, Education, Employers.

## I. INTRODUCTION

Education plays a crucial role in shaping careers, and academic certificates serve as proof of acquired knowledge and skills. However, traditional paper-based certificates face challenges such as forgery and difficult verification. The existing verification process is slow and lacks transparency. Employers often need to contact universities directly to verify credentials. This manual approach consumes time and resources. Fake certificates further reduce trust in the system. Blockchain technology offers a secure and transparent solution. It ensures immutability and prevents unauthorized modifications. The proposed Academic Certificate Verification System uses blockchain for secure storage. It enables fast and reliable verification of credentials. This system improves trust, efficiency, and security in academic verification.

### Objectives

- The system locks certificates onto the blockchain, putting an end to fake documents and guaranteeing every credential is real.
- Employers get answers right away—just check the hash and see if a certificate is legit.
- Universities manage all their certificates in one place, skipping piles of paperwork and messy processes.
- Graduates get quick access to their certificates and can share them easily—no more chasing the school for copies.
- Employers can trust the hiring process again, since fake candidates get weeded out and qualified people get recognized.
- Going digital means less printing, so it saves time and resources.

## II. LITERATURE SURVEY

The Blockchain technology provides a secure and immutable framework for data storage and verification. Nakamoto introduced the concept of a decentralized ledger through Bitcoin, eliminating the need for trusted intermediaries and ensuring data integrity using cryptographic hashing. This foundational concept is highly relevant for preventing academic certificate forgery. Wood extended blockchain functionality by introducing Ethereum, which supports smart contracts and programmable transactions. Smart contracts enable automated issuance and verification of academic certificates, reducing manual intervention and improving system efficiency. Crosby *et al.* discussed blockchain's potential beyond cryptocurrency and highlighted its core features such as transparency, decentralization, and security. Their study identified education as a suitable domain for blockchain adoption due to the need for reliable record verification. Dinh *et al.* analyzed private blockchain platforms and demonstrated that permissioned blockchains offer better scalability and controlled access for enterprise applications. Hyperledger Fabric documentation further supports

the use of permissioned blockchain systems with role-based access control and identity management. These studies collectively justify the use of blockchain technology for secure and efficient academic certificate verification systems.

### **III. PROBLEM STATEMENT**

Educational certificates really matter. Students work hard for them, and those documents open up jobs and further study. But the old way of handling certificates just doesn't cut it anymore. It's outdated and easy to mess with. The problem of fake degrees keeps getting worse, with more and more counterfeit certificates popping up every year. It's surprisingly easy to fake certificates these days. With modern printers and design software, anyone with the right tools can whip up something that looks official—even down to seals, signatures, and those security details that used to keep fraudsters out. Organizations scramble to keep their security measures current, but honestly, fake documents still slip through all the time. That leaves everyone doubting whether any certificate is real, especially when it comes to job applications

### **IV. EXISTING SYSTEM**

Traditional academic certificate management relies mainly on paper-based documents and manual verification processes. Universities issue physical certificates with security features such as watermarks and holograms. Certificate details are stored in physical records or basic digital databases. Students receive certificates during graduation ceremonies or through postal services. Employers must contact universities directly to verify candidate credentials. This verification process is time-consuming and resource-intensive. Some institutions provide scanned certificates through centralized servers. However, these systems are vulnerable to cyber-attacks and data tampering. Third-party verification agencies act as intermediaries for credential validation. These services often involve additional costs and delays. Overall, the existing system lacks transparency, security, and efficiency.

### **V. DISADVANTAGES**

- Physical academic certificates are highly vulnerable to forgery and duplication. Counterfeit certificates can be created using basic printing and design tools.
- This creates serious trust issues for employers and academic institutions.
- Certificate verification is a slow and time-consuming process. Employers often wait weeks or months for confirmation from universities.
- Universities must maintain large physical storage spaces for records . Managing and securing these archives requires significant cost and effort.
- Physical documents are at risk of damage, loss, or deterioration over time. Natural disasters or accidents can permanently destroy important records.
- Students face inconvenience when accessing or requesting certificates. Overall, the existing system is inefficient, insecure, and inconvenient.

### **VI. PROPOSED SYSTEM**

The Academic Certificate Verification System introduces a blockchain-based solution to overcome the limitations of traditional methods. It integrates blockchain technology with web-based applications for secure certificate management. Universities issue certificates directly onto the Ethereum blockchain. Once stored, certificate records are immutable and cannot be altered or deleted. The system provides three portals for universities, students, and employers. University administrators upload and manage academic certificates. Students access certificates through a personal dashboard and share verification details. Employers verify certificates instantly using blockchain hash values. The backend is developed using Flask with MongoDB for data storage. Cryptographic hashing and blockchain security prevent fraud and ensure authenticity.

#### **ADVANTAGES**

- Blockchain ensures certificates are secure, tamper-proof, and authentic.
- Universities save costs on paper, printing, storage, and manual handling.
- Employers can instantly verify credentials, speeding up recruitment.



- Students can access certificates anytime, anywhere without hassle.
- Going digital reduces paper usage, benefiting the environment.

## SYSTEM REQUIREMENTS

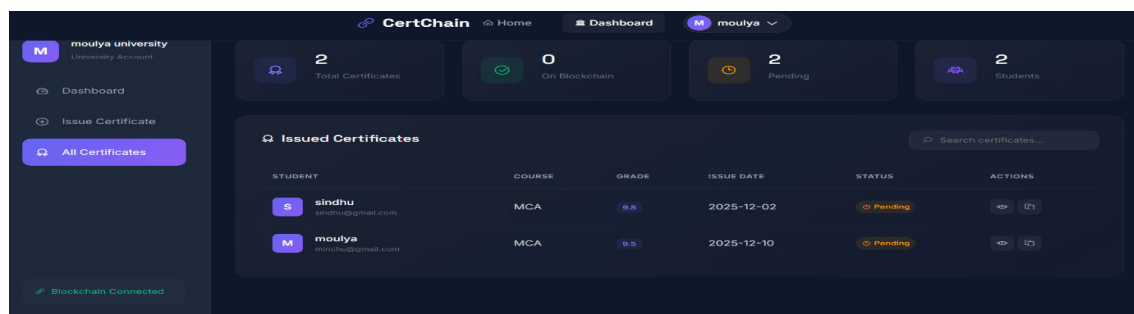
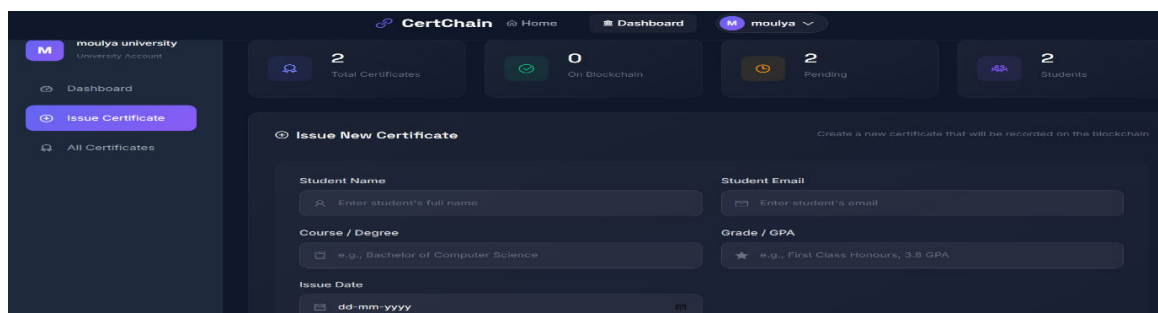
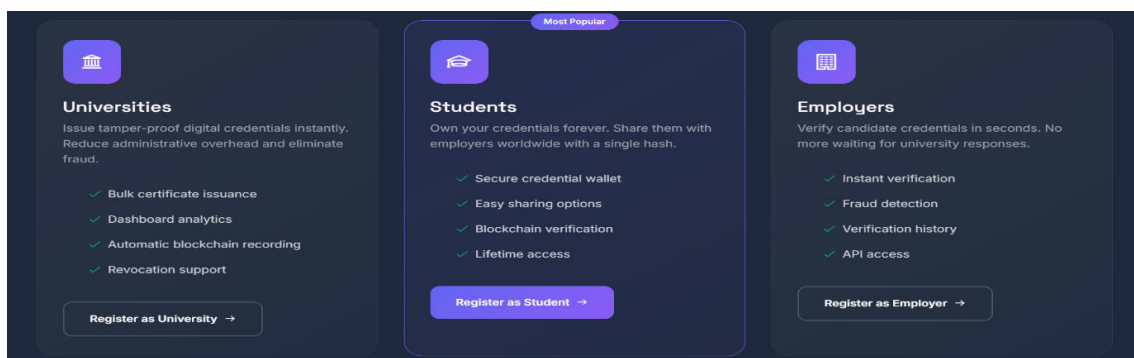
### Hardware Requirements

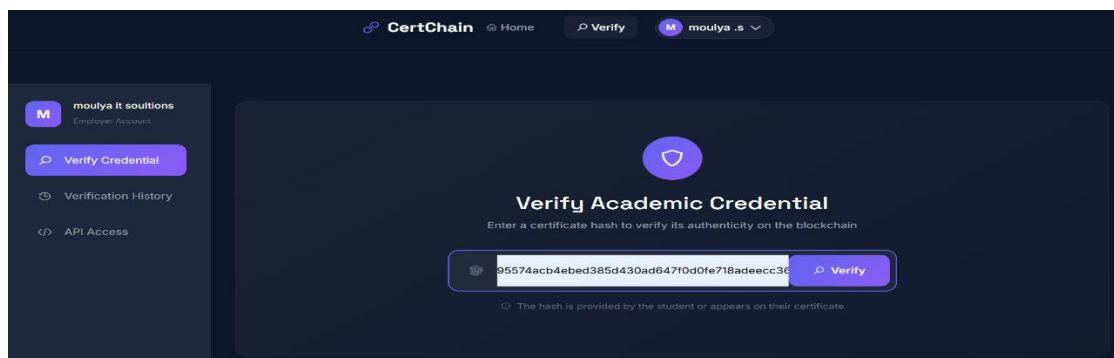
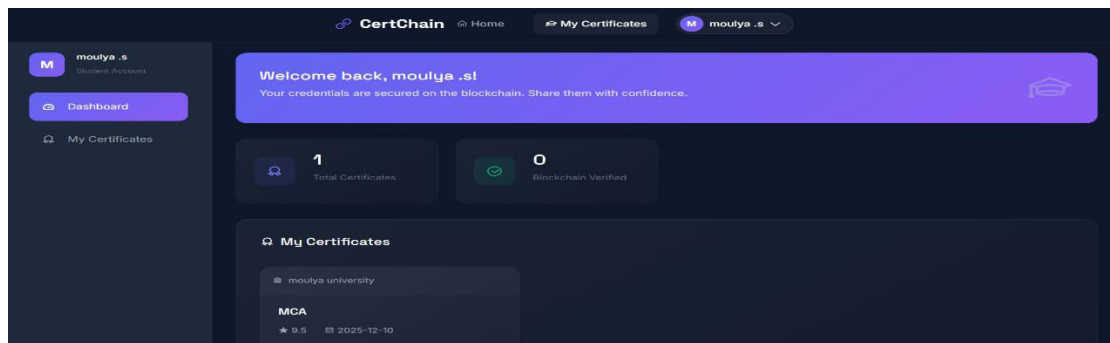
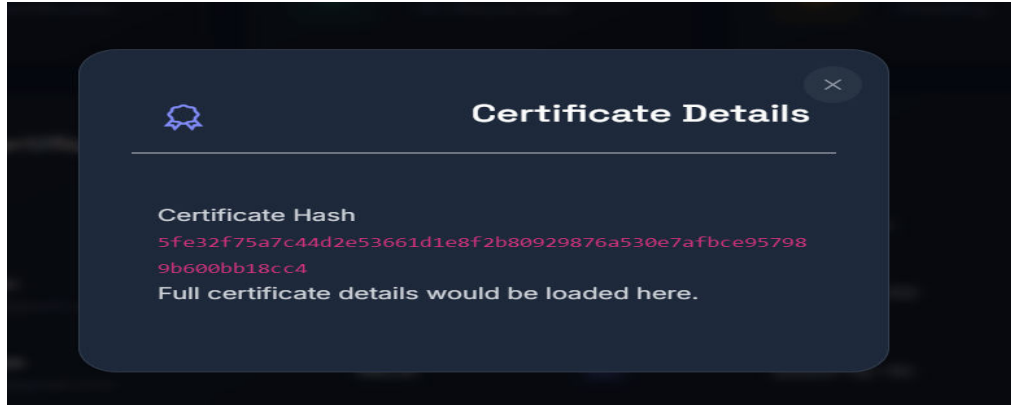
- Device: Laptop/Desktop
- Processor: Intel Core i5 or Equivalent
- RAM: Minimum 8 GB for Smooth Execution
- Storage: 256 or higher

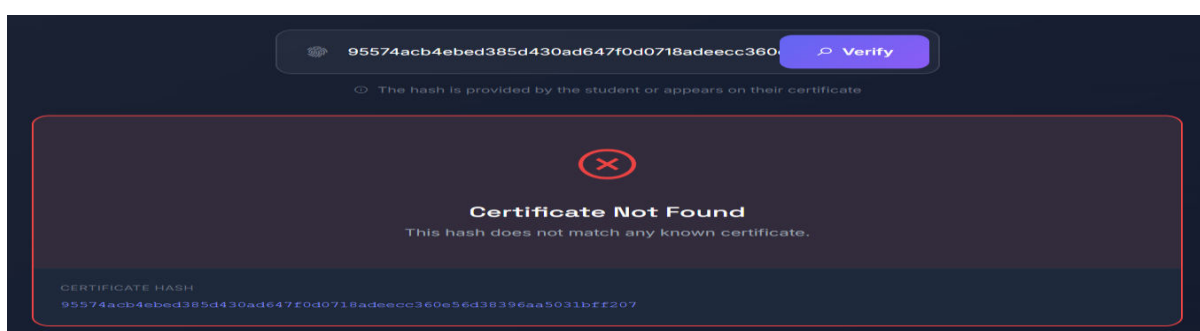
### Software Requirements

- Frontend : React.js
- Backend : Node.js with Ezpress.js
- Database : MongoDB
- Authentication : JWT
- API : RESTful API
- IDE : VS code

## VII. RESULTS







## VIII. CONCLUSION

The Academic Certificate Verification System shows how blockchain can improve credential management. It replaces traditional paper-based verification with a secure, tamper-proof solution. Certificates are stored on the blockchain with cryptographic hashing to ensure authenticity. Verification is instant, saving time for employers and students. The system reduces administrative work and operational costs for universities.

Students can access certificates anytime, anywhere. Employers can validate credentials quickly and reliably. The platform uses a modern tech stack with React, Node.js, MongoDB, and Ethereum. It is scalable, fast, and performs well under heavy use. Going digital also reduces paper waste, supporting sustainability. Overall, the system builds trust, efficiency, and security in academic verification.

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