



## Blockchain Technology for Digital Educational Certificate Verification

P. A. Dhokare

Assistant Professor, Department of Computer Science, K.H. College, Gargoti-416209, Maharashtra, India  
Email: [pradnyatibile98@gmail.com](mailto:pradnyatibile98@gmail.com)

Peer Review Information	Abstract
<p><i>Submission: 15 April 2026</i></p> <p><i>Revision: 30 April 2026</i></p> <p><i>Acceptance: 09 May 2026</i></p> <p><b>Keywords</b></p> <p><i>Blockchain Technology, Graduation Certificate, Certificate Verification, Fake Certificate Prevention, Digital Records</i></p>	<p>Graduation certificate verification is very important for colleges, companies, and organizations to ensure that a certificate is genuine and not fake. Currently, the process of certificate verification is mostly performed manually, which is time-consuming and may lead to errors or fraud. Fake certificates are also becoming a major problem.</p> <p>To solve this issue, this project uses blockchain technology for graduation certificate verification. Blockchain is a secure and distributed system where stored data cannot be modified or tampered with. In this system, colleges upload graduation certificate details to the blockchain. Each certificate is stored as a digital record that is secure and immutable.</p> <p>Anyone who needs to verify the certificate, such as employers or authorities, can access the blockchain record. This makes the verification process fast, transparent, and secure. Smart contracts are also used to automate the process of issuing and verifying certificates without requiring any intermediary.</p> <p>This system helps prevent certificate fraud, saves time, and increases trust in the verification process. It provides a reliable and secure solution for managing and verifying graduation certificates.</p>

### Introduction

Graduation certificates are important papers that show a student has finished their studies. These certificates are needed for further education, applying for jobs, and proving education to government agencies. Since they are so important, they need to be real and dependable. But right now, checking if a certificate is genuine is done by hand, which takes a lot of time and effort. There's also a risk of fake certificates and people trying to change the information.

Many companies and groups find it hard to check if a certificate is real because they have to call the school or college directly.

This method is slow, expensive, and not very safe. As more fake certificates appear, there's a big need for a better and more trustworthy way to check them.

Blockchain technology is a good answer to this

problem.

Blockchain is a secure, digital system that keeps information safe and unchangeable once it's stored. In this project, blockchain is used to hold graduation certificate details securely. Schools and universities upload the information to the blockchain, and people who are allowed can check it quickly and easily.

Using blockchain for checking graduation certificates helps stop fraud, saves time, and builds more trust between schools and employers.

This system makes checking faster, safer, and more open.

### Literature Review

Rana F. Ghan et al.(2022),In this study, they created and put into use an electronic system for issuing certificates. The system was built on the Hyperledger private blockchain. It allows many

transactions to be processed on the blockchain in just a few seconds. The system uses smart contracts and hashing to ensure the certificates are safe and properly managed [1]. Osman Ghazali and Omar S. Saleh they concluded the model saves all the information needed to check certificates straight on the blockchain. When an employer wants to confirm a certificate, they don't have to call the university. They just check if the hash and university key match the digital signature [2]. Roshani S. Bele, Jayant P. Mehare (2021), This study shows that blockchain technology can offer about 85% security for academic documents. Because of this, SecureCert, which uses blockchain technology, has added more protection to students' assets by storing each certificate in secure blocks[3]. Tolulope Ifeyemi et al.(2024), They shows entire paper is about creating a system that can efficiently and effectively issue and check certificates for Olabisi Onabanjo University using the Celo blockchain platform. The system is built to meet the university's needs and has the ability to cancel certificates when needed. It makes certificate verification easier and better for all users. The evaluation done with users showed that they liked the system and suggested that it should be regularly maintained[4]. Y. Shakan et al.(2021), They experimented and shows solution explains the whole process, both off-chain and on-chain, that covers a student's registration, verification, and confirmation of their educational documents. The platform helps transfer credits between universities and offers a flexible way to check a student's progress. For future work, we plan to launch this platform at many higher education institutions[5]. Kumutha.K, S.Jayalakshmi(2021), They suggested a digital certificate checking system that uses blockchain. It includes a way to confirm the owner's identity and saves the students' time and place as blocks on the blockchain. The system works as a shared public record that can't be changed or altered, keeping the documents' history safe and secure[6]. OMAR S. SALEH et al.(2020), This study found and talked about the security aspects needed for checking educational certificates using blockchain[7]. Abdulkareem Saber Kareem, Ahmed Chalak Shakir (2023), They explained how blockchain helps improve the Academic Certificate Authentication System (ACAS). It also looks at and talks about the important parts of blockchain that are useful for verifying academic certificates[8]. Elva Leka, Besnik Selimi (2021) , They finds to create a safe, fast, and easy-to-use blockchain system for making, handling, and checking academic certificates[9]. OMAR S. SALEH, OSMAN

GHAZALI (2020) , They finds the important security needs for verifying educational certificates on a blockchain. These needs include making sure the right person is who they say they are, giving permission to access information, keeping data private, ensuring information is not shared without permission, and managing who owns the certificate. The paper also suggests a blockchain framework using Hyperledger Fabric to make certificate verification safe and reliable, and it has plans to test this system in some educational institutions later[10]. Binh Minh Nguyen, Thanh-Chung Dao et al.(2020) , They talked about the issue of certificate authentication in Vietnam. Then, we introduced our prototype called VECefblock, which is a blockchain-based application designed to solve the problem of fake diplomas[11]. Amjad Rakha & Ahmad Alzubi (2025) , They shows the Deep Certifier-DX509 model, which uses deep learning, specifically MA-DLSTM with attention mechanisms, to offer personalized course suggestions, along with X509 blockchain technology for issuing digital certificates. This model is designed to give secure and verified certificates, make accurate course recommendations based on users' past academic results, lower the amount of computing needed, keep important context, and perform better than other recommendation systems in both accuracy and security[12].

### Research Methodology

This project follows a systematic approach to design and develop a blockchain-based system for graduation certificate verification. The main aim of the research is to create a secure, transparent, and reliable method to verify graduation certificates and reduce certificate fraud.

First, a detailed study of the existing certificate verification system is carried out. The problems such as manual verification, delay, lack of security, and chances of fake certificates are identified. Based on this study, the need for a blockchain-based solution is analyzed.

Next, the system architecture is designed using blockchain technology. Educational institutions are considered as authorized authorities who issue graduation certificates. The certificate data is converted into a digital format and a unique cryptographic hash is generated. This hash is then stored on the blockchain, which ensures that the data cannot be changed or tampered with. Smart contracts are developed to automate the process of certificate issuing and verification. These smart contracts define the rules and conditions for storing and accessing certificate records. Only authorized users are

allowed to upload or verify certificates.

A prototype of the system is implemented using a blockchain platform. Test cases are conducted to verify the accuracy, security, and performance of the system. The results are analyzed to ensure that the system provides fast and secure certificate verification.

Finally, the proposed system is evaluated by comparing it with the traditional verification method. The research shows that the blockchain-based approach improves security, reduces verification time, and increases trust in the certification process.

### Result and Discussion

The blockchain-based graduation certificate verification system was successfully designed and tested. The results show that the proposed system provides a secure and efficient method for verifying graduation certificates. Once the certificate details are uploaded by the educational institution, the information is stored on the blockchain in the form of a unique hash. This ensures that the certificate data cannot be altered or misused.

During testing, the system was able to verify certificates quickly compared to the traditional manual verification process. Employers and verification authorities could check the authenticity of a certificate without contacting the college directly. This reduced verification time and saved effort for both institutions and employers.

The use of blockchain technology helped in preventing fake certificates. Any attempt to change the certificate data resulted in a mismatch with the stored blockchain record, making fraud detection easy. Smart contracts worked effectively by automating the issuing and verification process and allowing access only to authorized users.

The discussion of results shows that the proposed system improves transparency and trust in certificate verification. It reduces dependency on third parties and minimizes human errors. However, the system requires proper internet connectivity and basic technical knowledge for implementation. Overall, the blockchain-based approach proved to be more secure, reliable, and efficient than the existing traditional verification methods.

### Conclusion

The blockchain-based graduation certificate verification system is a secure, fast, and reliable way to verify certificates. It helps prevent fake certificates and ensures that the certificate data cannot be changed or tampered with. The system allows employers and other authorities

to check certificate authenticity quickly without contacting the college directly. By using blockchain and smart contracts, the process becomes automated, transparent, and less prone to errors. Overall, this system is better than the traditional manual verification method, saves time, increases trust, and provides a modern solution for managing and verifying graduation certificates.

### References

Nguyen, B. M., Dao, T. C., & Do, B. L. (2020). Towards a blockchain-based certificate authentication system in Vietnam. *PeerJ Computer Science*, 2020(3). <https://doi.org/10.7717/peerj-cs.266>

Leka, E., & Selimi, B. (2021). Development and evaluation of blockchain based secure application for verification and validation of academic certificates. *Annals of Emerging Technologies in Computing*, 5(2), 22–36. <https://doi.org/10.33166/AETiC.2021.02.003>

kareem, A., & Shakir, A. C. (2023). Review: Verification Process of Academic Certificates Using Blockchain Technology. *Kirkuk University Journal-Scientific Studies*, 18(1), 62–75. <https://doi.org/10.32894/kujss.2023.135876.1072>

Saleh, O. S., Ghazali, O., & Rana, M. E. (2020). Blockchain based framework for educational certificates verification. *Journal of Critical Reviews*, 7(3), 79–84. <https://doi.org/10.31838/jcr.07.03.13>

Kumutha, K., & Jayalakshmi, S. (2021). The Impact of the Blockchain on Academic Certificate Verification System-Review. *EAI Endorsed Transactions on Energy Web*, 8(36), 1–8. <https://doi.org/10.4108/eai.29-4-2021.169426>

Shakan, Y., Kumalakov, B., Mutanov, G., Mamykova, Z., & Kistaubayev, Y. (2021). Verification of University Student and Graduate Data using Blockchain Technology. *International Journal of Computers, Communications and Control*, 16(5), 1–16. <https://doi.org/10.15837/ijccc.2021.5.4266>

Ifeyemi, T., Oyedeji, A., & Adebisi, F. (2024). a Blockchain-Based Digital Educational Certificate Verification System. *Journal of Engineering and Technology for Industrial Applications*, 10(49), 35–41. <https://doi.org/10.5935/jetia.v10i49.1145>

Bele, R., & Publication, R. (2021). a Review on

Digital Degree Certificate Using Blockchain Technology. *International Journal of Creative Research Thoughts*, 9(2), 5150–5156.

Ghazali, O., & Saleh, O. S. (2018). A graduation certificate verification model via utilization of the blockchain technology. *Journal of Telecommunication, Electronic and Computer Engineering*, 10(3-2), 29-34.

Ghani, R. F., Salman, A. A., Khudhair, A. B., & Aljobouri, L. (2022). Blockchain-based student certificate management and system sharing using hyperledger fabric platform. *Periodicals of Engineering and Natural Sciences (PEN)*, 10(2), 207-218.

<https://doi.org/10.21533/pen.v10.i2.599>

Rakha, A., & Alzubi, A. (2025). A blockchain-based deep learning approach for student course recommendation and secure digital certification. *Scientific Reports*, 15(1), 1-17.

<https://doi.org/10.1038/s41598-025-14778-3>