**Academic Credential Verification Using Blockchain**

**A Project Work Synopsis**

*Submitted in the partial fulfillment for the award of the degree of*

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**1 INTRODUCTION**

Blockchain innovation is a rising innovation and offer highlights like decentralized, straightforward and sealed information stockpiling. It could be utilized to tackle issues for instance like absence of trust, misrepresentation, high exchange cost and sharing security Consequently, blockchain innovation may be a hopeful innovation to forestall the misrepresentation exercise in our present academic credential verification system which includes a lot of paper work, forged degrees or degree from fake universities, delay admission processes and human error.

“Academic credential verification using Blockchain” focuses on checking the authenticity and integrity of the academic credential that have been issued by the University in an optimal and efficient way. it allows the recruiters to verify the credentials of job applicant faster by removing the third party (University) and thus reducing the time delay and making the verification process much more efficient. This will lead to a smooth credential verification and solve the problem of fake academic credential in order to get a job or admission in a university.

**2 LITERATURE REVIEW**

This research is done by Krishnan, Kumutha & S., Jeyalaksshmi. (2021). Blockchain Technology and Academic Certificate Authenticity-Review. Blockchain technology has the abilities that are Decentralized, Distributed, Secure and Faster, Transparent, and non-modifiable. These are more beneficial than the existing technologies. For students, educational certificates are the most important documents issued by their universities. However, as the issuing process is not that transparent and verifiable, fake certificates can be easily created. Blockchain technology has recently emerged as a potential mean for authenticating the document verification process and a significant tool to struggle document fraud and misuse. This research aimed to enhance the document verification process using blockchain technology

This research is done by Michoulis, George & Petridou, Sophia & Vergidis, Kostas & Michoulis, George. (2020). Verification of Academic Qualifications through Ethereum Blockchain: An Introduction to VerDe. Blockchain technology significantly contributes to the verification process of academic qualifications since, by design, is resistant to modification of the data it holds. Blockchain is an open, distributed ledger that can record transactions of a community efficiently and in a verifiable and permanent way. In the context of academic qualifications, it can be assumed that: an academic qualification is a public transaction between an Institution and an individual, some stakeholders need to access these transactions, and, each transaction cannot be modified once executed. These assumptions in conjunction with the decentralized nature of blockchain and the nonnecessity of a trusted authority make blockchain an attractive solution. This paper presents the conceptual design of VerDe, an application that aims to verify academic qualifications exploiting the Ethereum Blockchain. Similar applications have been proposed in literature but appear to have high implementation and maintenance costs.

This research is done by Krishnan, Kumutha & Jayalakshmi, S (2021). The Impact of the Blockchain on Academic Certificate Verification System-Review. Blockchain innovation guarantees benefits in believe capacity, collaboration, organization, identifying proof, validity, and transparency. These solid suggestions for the long run of how to verify the authenticity of academic certificates because a paper-based certification is fallible to manipulation and susceptible to fraud.. This paper proposes a digital certificate verification blockchain based system employing anowner authentication scheme and time, space of the students are stored as blocks using blockchain technology. A distributed public record with tamper proof and immutable that preserves the state of the document, which creates security in the digital asset. This clearly stated that this technology is required to keep digital assets in secure and any one can access without loss of data and maintained it with minimum cost.

This Research is done by Badhe, Vipul & Nhavale, Pooja & Todkar, Sonal & Shinde, Prajakta & Kolhar, Kiran. While the number of universities, tertiary education students and number of graduates per year constantly increase, the need to easily verify degree certificates generates new business opportunities Students demand a proof-of-certification at low cost and easy to check, employers also demand quick and trustable verification of degrees when recruiting. As large number of students graduate every year, the problem of fake certificates is a big issue. One can easily get fake certificates in India. Companies hiring thousands of fresher spend large amount of money to get the educational certificates and transcripts verified of applicants. A Digital Certificate using blockchain technology can address this problem. Blockchain is a decentralized distributed digital ledger collectively maintained by a network of computers, called nodes. The data in the blockchain cannot be modified by a person without the consent of everyone else who maintains the records. This makes the data secure.

This Research is done by hakan, Yassynzhan & Kumalakov, Bolatzhan & Mutanov, Galimkair & Mamykova, Zhanl & Kistaubayev, Ye.I.. (2021). Verification of University Student and Graduate Data using Blockchain Technology. Blockchain is a reliable and innovative technology that harnesses education and training through digital technologies. Nonetheless, it has been still an issue keeping track of student/graduate academic achievement and blockchain access rights management. Furthermore, academic achievement documents issued by institutions are not secured against unauthorized changes due to the involvement of intermediaries. Therefore, verification of official educational documents has become a pressing issue owing to the recent development of digital technologies. However, effective tools to accelerate the verification are rare as the process takes time. This study provides a prototype of the UniverCert platform based on a consortium version of the decentralized, open-source Ethereum blockchain technology. The proposed platform is based on a globally distributed peer-to-peer network that allows educational institutions to partner with the blockchain network, track student data, verify academic performance, and share documents with other stakeholders.

**3 PROBLEM FORMULATION**

Education acts as a soul in the overall societal development, in one way or the other. Aspirants, who gain their degrees genuinely, will help society with their knowledge and skills. But, on the other side of the coin, the problem of fake certificates is alarming and worrying. It has been prevalent in different forms from paper-based dummy certificates to replicas backed with database tampering and has increased to astronomic levels in this digital era. The proposed system makes sure that the certificates, once verified, can be present online in an immutable form for further reference and provides a tamper-proof concealment to the existing certification system. To confirm the credibility of the proposed method, a prototype of blockchain-based credential securing and verification system is developed in ethereum test network. The implementation and test results show that it is a secure and feasible solution to online credential management system.

**4 OBJECTIVES**

The proposed system focuses on checking the authenticity and integrity of the academic credential that have been issued by the University in an optimal and efficient way. it allows the recruiters to verify the credentials of job applicant faster by removing the third party (University) and thus reducing the time delay and making the verification process much more efficient. This will lead to a smooth credential verification and solve the problem of fake academic credential in order to get a job or admission in a university.

The proposed aim will be achieved by dividing the work into following

Objectives as mentioned in the figure:

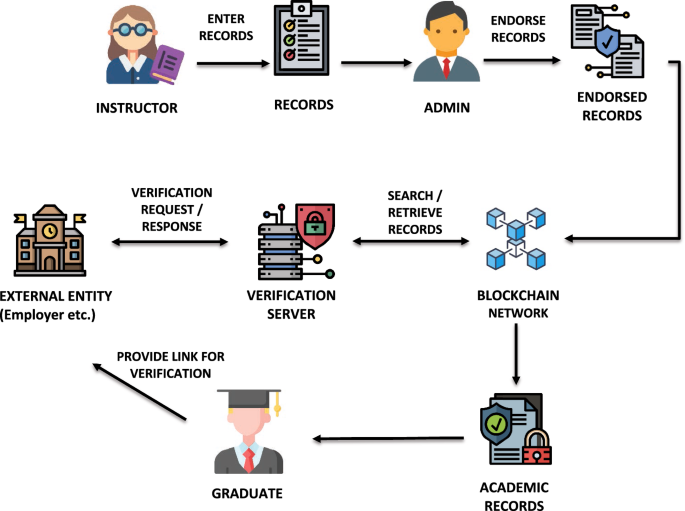


Figure: 1

**5 METHODOLOGY**

The following methodology will be followed to achieve the objectives defined for proposed research work:

1. Detailed study of the traditional system will be done
2. Relative pros and cons will be identified
3. Various parameter will be identified to evaluate the proposed system
4. Blockchain will be chosen based on the consensus algorithm
5. The development Environment will be set up
6. Smart contract will be made for automation and carry protocols of the verification system
7. The interface for user and admin will be made
8. The admin will upload the endorse record to blockchain
9. Verification link will be provided by the student
10. External entity can request verification server for record verification
11. Server will send the appropriate response
12. Comparison of new implemented approach with exiting approach will be done.

**6 EXPERIMENTAL SETUPS**

* **Ethereum:** Ethereum is a decentralized public blockchain platform that establishes a peer-to-peer network that securely executes and verifies application code, called smart contracts.
* **Solidity**: (ver. 0.8.17) Solidity is an Ethereum specific JS like language. The smart contract logic and workflow was developed in Solidity
* **Truffle:** (ver.5.6.0) Truffle is a development environment based on Ethereum Blockchain, used to develop Distributed Apps. Truffle is used for Compiling Contracts, Deploying Contracts, injecting it into a web app, Creating front-end for Distributed Apps and Testing.
* **ReactJS:** (ver.18.0) Front-end Development using ReactJS to create interactive user interface
* **Azure/AWS**:  file storage, Ethereum network handling, and user authentication are handled in Microsoft Azure Blockchain Workbench API calls.

**7 RESULTS AND DISCUSSION**

The problem of manual authentication of each credential can be solved by saving the Blockchain encrypted academic credentials The Blockchain platform makes transactions unchangeable and openly verifiable; these Blockchain properties are used to produce digital certificates that are flawless and simple to check. We have developed a web portal which is linked to the Blockchain that stores the academic credentials of all the students who have graduated from the University. The potential employer/ educational institute can access a web portal designed by us to verify all details of the students after providing necessary credentials given to them by the student. With the help of our applications. The digital certificates are stored on an Ethereum Blockchain. Our solution is scalable, and because of the use of Blockchain, it provides immutability. As the backend is handled by the AWS, we do not have to worry about the overhead costs. This makes maintenance costs cheaper significantly. We have tabulated the cost of some operations, which helped us to come to the conclusion that the Ethereum Blockchain is highly cost-effective in comparison to other Blockchain Systems

Benefits

• **No third-party involvement**: This methodology would prevent the participation of the third party in the process of validation of academic credentials.

• **The portal is accessible 24 / 7**: Since this will be an online portal, it will be readily available to the authorised users whenever and wherever required.

• **Robust data security:** Since the system uses blockchain technology, it ensures high transparency, offering a more secure network to store students' private data. Any change made to the data is easily traceable, thus minimising risk to forgery of data.

• **Environmentally Safe:** Since the whole system will be digitalised, it will help in saving paper and time, thus contributing to environmental sustainability.

**. • Putting back the trust in education:** When institutions merge with other bodies or there is war or other natural calamities, the academic data will be safe and protected.

**• No more fake certificates:** There will be no more morphed certificates as certificates will be digitally verified.

**• Multiple verifications at once:** Multiple certificates are verified once at the time.

**8 CONCLUSION AND FUTURE SCOPE**

The resulted web application based on the blockchain technology will furthermore corelate with other existing educational application this will solve the problem of the forged certificate, manual authentication of each record and create the process much more efficient by saving weeks of time and paper work. For analysts, blockchain can possibly be trying to concentrate all the more intently on subjects like identity management, document management, certificate verification, health care, insurance, e-voting, supply chain management, property management etc. While physical anti-counterfeiting features prevent tampering chances, digital solutions help in intelligence and identifying culprits in the systems as well as facilitating fast and convenient authentication. Many Universities are now using digital track and trace solutions. Prospective employer/ university professionals can check the authenticity of the degree through scanning these QR codes. However the application of blockchain technology in education domain are more beneficial but still this research topic is in exploratory phase and the proceeding of blockchain standards and regulations is necessary to expand its use in this education domain

**6 TENTATIVE CHAPTER PLAN FOR THE PROPOSED WORK**

**CHAPTER 1: INTRODUCTION**

This chapter will cover the overview of ...................................

**CHAPTER 2: LITERATURE REVIEW**

This chapter include the literature available for ............................... The findings of the

researchers will be highlighted which will become basis of current implementation.

**CHAPTER 2: BACKGROUND OF PROPOSED METHOD**

This chapter will provide introduction to the concepts which are necessary to understand the proposed system.

**CHAPTER 4: METHODOLOGY**

This chapter will cover the technical details of the proposed approach.

**CHAPTER 5: EXPERIMENTAL SETUP**

This chapter will provide information about the subject system and tools used for evaluation of proposed method.

**CHAPTER 6: RESULTS AND DISCUSSION**

The result of proposed technique will be discussed in this chapter.

**CHAPTER 7: CONCLUSION AND FUTURE SCOPE**

The major finding of the work will be presented in this chapter. Also directions for extending the current study will be discussed.

**PUBLICATIONS (Optional)**

**REFERENCES**

**7 REFERENCES**

1. Professor Kumutha.K and Dr. S. Jayalakshmi “Blockchain Technology and Academic Certificate Authenticity-Review” in *2021 ICOECAIN Bangalore*
2. EURASIP journal on Information Security 2021, Article number 7 by Rama Reddy, T., Prasad Reddy, P.V.G.D., Srinivas, R.
3. “Blockchain-Based Academic Certificate Verification System—A Review” conference paper by Shivani Pathak, Vimal Gupta, Nitima Malsa, Ankush Ghosh & R. N. Shaw