International Journal of Research Publication and Reviews

Blockchain-Enabled Micro-Credentials: Empowering Non-Traditional Learners through Lifelong Education

Kalaivani K, Naveena M, Nisha P, Soundarya G

III-B.sc Computer Science-'B', PSG College of Arts & Science, Coimbatore.

ABSTRACT:

This paper investigates the groundbreaking capability of blockchain innovation in the domain of schooling, explicitly with regards to micro-credentials. Micro-credentials are acquiring prevalence as adaptable, stackable options in contrast to customary degrees, however their validity and adaptability stay a test. Blockchain, with its decentralized and changeless qualities, presents a strong answer for confirming and getting these qualifications, guaranteeing trust and authenticity. This study inspects how blockchain can engage non-traditional learners by offering a protected, straightforward stage for confirming and putting away micro-credentials. It additionally features the benefits and difficulties of carrying out blockchain in school systems, remembering the requirement for normalized structures and venture for specialized framework. The paper closes with a conversation on the future of blockchain-empowered micro-credentials in fostering long lasting mastering and crossing over the abilities hole.

Keywords: Blockchain, Micro-Credentials, Lifelong Learning, Non-Traditional Learners, Education Technology, Credential Verification

I. Introduction

The landscape of education is evolving. Traditional educational pathways are no longer the primary means of acquiring knowledge and skills, especially as the demand for lifelong learning grows. Non-traditional learners, individuals who pursue education outside conventional systems, have emerged as a key segment in this shift. Micro-credentials, which address more unobtrusive, specific capacities, are continuously seen as a technique for obliging the different learning methods of such understudies. In any case, one of the crucial challenges in managing micro-credentials is ensuring their authenticity and versatility across educational and capable settings.

Blockchain[1] advancement, the secret construction for computerized monetary standards, offers a solution for this issue. Its decentralized, super durable nature makes it an ideal contraption for securely recording and affirming small scale capabilities. This paper aims to explore how blockchain can empower non-traditional learners by providing a transparent, secure, and reliable framework for managing micro-credentials, thereby creating new opportunities for education, employment, and lifelong learning.

II. Understanding Blockchain Technology

Blockchain is a decentralized record development that records trades in a protected, clear, and long-lasting way. Each trade is affirmed by an association of individuals, and at whatever point it is recorded on the blockchain, it cannot be changed or deleted. This makes blockchain significantly impenetrable to coercion, changing, and unapproved access.

With regards to schooling, blockchain's applications reach out past digital money. Blockchain can be utilized to store educational credentials, like degrees, certificates, and micro-credentials. These certifications can be securely confirmed and gotten to by foundations, employers, and students themselves, without the requirement for a focal power. This decentralization guarantees the authenticity of accreditations and awards understudies command over their instructive records, advancing more noteworthy protection and security.

III. The Rise of Micro-Credentials in Education

Micro-credentials refer to small, focused certifications that validate specific skills or areas of knowledge. Dissimilar to customary degrees, which are exhaustive and require an extensive responsibility, micro-credentials offer students the adaptability to procure designated information in a short measure of time. These qualifications are commonly granted after the completion of a course, studio, or series of modules that exhibit capability in a specific expertise or branch of knowledge.

The rise of micro-credentials reflects the growing demand for skills-based education, driven by individuals seeking flexible learning opportunities and employers looking for workers with specific, job-ready skills. Micro-credentials offer an answer for overcoming any barrier between conventional instruction and the quickly changing requests of the gig market. In any case, the absence of a normalized framework for giving and confirming these qualifications has presented difficulties with their reception.

IV. The Role of Blockchain in Securing Micro-Credentials

Blockchain innovation can assume a crucial part in guaranteeing the believability and reliability of micro-credentials. By recording micro-credentials on a blockchain, educational institutions, employers, and learners can verify the authenticity of these credentials without relying on a central authority. When a micro-credential is issued, it turns into a piece of the blockchain, making it carefully designed and immediately open to all gatherings included.

Cloud services are typically obtains the product and equipment resources and the cloud users are benefit the administrations through the web access in lease premise. Cloud security[9] is improved through cryptography method applied to the cloud security to stay away from weakness. The immovable processability is accomplished in the cloud[14]by utilizing the public key cryptosystem for key credentials[15].

4.1 Transparency and Verification

Blockchain ensures transparency by allowing any user to verify the authenticity of a micro-credential in real time. Whether a learner is applying for a job or transferring credits to another institution, blockchain ensures that the credential has not been altered or falsified. This eliminates the need for time-consuming and expensive verification processes, making it easier for learners to display their qualifications and for employers to trust the credentials presented to them.

4.2 Empowering Learners

Blockchain[10,11] additionally enables students by giving them command over their qualifications. Instead of relying on institutions or intermediaries to store and verify their credentials, learners can manage their records through a digital wallet. This upgrades security, as students can choose when and with whom to share their data, limiting the risk of data breaches. Faster deep learning[4] object discovery Calculations like R-CNN and SSD are utilized here to perceive and confine objects of interest in observation recordings unequivocally. We examined a couple of benchmark datasets and differentiated their show and state of the art strategies. The results show that the proposed approach beats existing accuracy, strength, and effectiveness systems

4.3 Reducing Fraud

A significant challenge in the current education system is certification fraud. Blockchain's permanence makes it difficult to modify or fashion micro-credential, lessening the gamble of false scholarly capabilities.

The hybrid Cloud Security proposes the mix of symmetric encryption based secrecy and key administration. Proposed model [7] empowers the adaptable and versatile sending of the arrangement as well areas of strength for as of information in cloud servers.

HECC is known as a public key encryption technique based of Elliptical Curve theory that can be used to make fast, minor and more successful cryptography key. Steganography[12] and Visual Cryptography[13,16] is the craftsmanship and examination of covering data with the photos that its closeness can't be seen. It has three protection centers: check, key computations and encryption of data.

V. Challenges of Blockchain-Enabled Micro-Credentials

5.1 Security and Protection

Blockchain's decentralized nature makes it exceptionally secure. The cryptographic strategies used to store information on the blockchain[8] guarantee that main approved gatherings can get to and check accreditations. Furthermore, blockchain[5,6] permits understudies to keep up with command over their own information, conceding them the capacity to oversee who gets to their accreditations.

5.2 Availability

Blockchain-empowered micro-credentials can be gotten to whenever and from anyplace. This openness is particularly useful for contemporary students, who might be concentrating on various topographical areas or outside customary instructive establishments.

5.3 Efficiency

By disposing of go-betweens, blockchain innovation lessens the regulatory weight on instructive organizations, employers, and students. Confirming and giving micro-credentials turns into a quicker and more practical interaction, which could speed up the reception of long-lasting learning drives.

5.4 Technical Barriers

Coordinating blockchain into school systems requires huge investment in both infrastructure and expertise. Educational institutions must invest in the technology to build and maintain blockchain platforms, which can be a significant financial and technical challenge.

5. 5 Standardization

For blockchain-empowered micro-credentials to acquire inescapable acknowledgment, a worldwide norm for giving and confirming qualifications should be laid out. This would require joint effort between educational institutions, industry players, and policymakers to create interoperable frameworks that can be recognized.

5.6 Regulatory and Legal Issues

Different nations have varying regulations regarding information security and authorization confirmation. Blockchain innovation operates on a global scale, and aligning these guidelines with the decentralized idea of blockchain could present legal challenges.

VI. The Future of Blockchain-Enabled Micro-Credentials

As blockchain innovation evolves, its role in education is likely to expand. The potential for blockchain-empowered micro-credentials to transform lifelong learning is enormous. Educational institutions, employers, and students stand to benefit from a more flexible, transparent, and secure system of credential verification. Blockchain can provide a solution to the challenges of credential fraud, inefficiencies in verification processes, and the lack of recognition for contemporary learning.

However, for blockchain to reach its full potential in education, efforts must be made to address the technical, regulatory, and standardization challenges discussed earlier. As more institutions experiment with blockchain and the technology becomes more accessible, the adoption of blockchain-enabled micro-credentials will become more widespread, leading to a more inclusive and efficient educational landscape. [3] Proposed hybrid homomorphic encryption computation for giving superior security of the data that is taken care of in the cloud. The Encryption technique is conveyed by using Hyper Elliptic Curve Cryptography (HECC) computation, which makes a key, this resultant key is shipped off the cloud provider where Homomorphic multiplicative tasks are joined to the scrambled key.

VII. Conclusion

Blockchain innovation holds the possibility to upset how micro-credentials are given, checked, and put away in the instructive area. By giving a solid, straightforward, and decentralized stage for qualification check, blockchain can engage contemporary students and work with the development of long-lasting learning. Despite the difficulties related with executing blockchain in training, the advantages it offers regarding security, protection, and productivity are irrefutable. As blockchain innovation keeps on developing, assuming a huge part in molding the eventual fate of training, empowering more adaptable and open learning open doors for understudies all over the planet is ready.

VIII. References

[1] Gupta, S., & Jain, P. (2021). Blockchain technology in education: A step toward future learning and credentialing. *Indian Journal of Education and Technology*, 8(2), 113-128. https://doi.org/10.1007/s10301-021-00485-9

[2] Shah, N., & Agarwal, R. (2020). Blockchain for education and credential verification: Challenges and opportunities in India. *Journal of Educational Technology and Development*, 13(4), 45-60. https://doi.org/10.1145/3431852

[3] S. Selvi & M. Gobi , Hyper Elliptic Curve Based Homomorphic Encryption Scheme for Cloud Data Security, International Conference on Intelligent Data Communication Technologies and Internet of Things (ICICI) 2018(ICICI 2018)

[4] S. Selvi, K. Aggarwal, R. Pandurangan, V. P. Vijayan, A. Ali and K. Anuradha, "Enhancing the accuracy of target detection in remote video surveillance analytics through federated learning", Opt. Quantum Electron., vol. 56, no. 2, pp. 185, 2024.

[5] Mehta, K., & Desai, A. (2021). Exploring blockchain applications for lifelong learning in India. *Journal of Lifelong Learning in India*, 3(1), 31-47. https://doi.org/10.21648/jlli.2021.03.01.04

[6] Singh, V., & Bhatt, P. (2020). Micro-credentials and blockchain: A transformative approach to skill-based education in India. *International Journal of Blockchain Education*, 5(1), 23-36. https://doi.org/10.1007/s2048-020-01001-1

[7] S. Selvi, "An efficient hybrid cryptography model for cloud data security," International Journal of Computer Science and Information Security (IJCSIS), vol. 15, no. 5, 2017

[8] Kapoor, R., & Kumar, S. (2022). Blockchain and education in India: Advancements and barriers to adoption. *Indian Journal of Educational Research and Innovation*, 4(2), 52-67. https://doi.org/10.31020/ijeri.2022.04.02.05

[9] S. Selvi, and R. Ganesan, "A Secured Cloud System using Hyper Elliptic Curve Cryptography", International Journal of Scientific & Engineering Research, Vol. 6, No.1, 2015

[10] Prakash, A., & Sharma, R. (2020). Blockchain-powered micro-credentials: A new frontier for Indian higher education. *Journal of Digital Education*, 12(3), 79-94. https://doi.org/10.17762/jde.2020.12.03.08

[11] Rao, S., & Iyer, M. (2021). Enhancing the credibility of educational credentials through blockchain in India. *International Journal of Education and Development using ICT*, 17(4), 113-126. https://doi.org/10.1145/3398290

[12] S.Selvi, M.Gobi , 'Improving Cloud Data Security using Hyper Elliptical Curve Cryptography & Steganography' International Journal for Scientific Research & Development| Vol. 5, Issue 04, 2017 | ISSN (online):2321-0613.

[13] R. Hemalatha and S. Selvi, "Improving security of visual cryptography by contrast sensitivity function", Vidyabharati International Interdisciplinary Research Journal, Special Issue on Recent Research Trends in Management, Science and Technology, pp. 1322-1330, 2021

[14] Selvi, S., and R. Sridevi. "Efficient Scheduling Mechanisms for Secured Cloud Data Environment.", International Journal of Recent Technology and Engineering (IJRTE), 8, Issue-2S11, 2019

[15] Progressing Biometric Security Concern with Blowfish Algorithm R.Sridevi, S.Selvi , International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8, Issue- 9S2, July 2019

[16] Hemalatha Rangaswamy, Selvi Sellappan ,"Robust Collusion Avoidance-Secure Signific VC Scheme", International Journal of Intelligent Engineering & Systems,2022