

Skill Certification Verifier in Blockchain: Digital Badges with Employer Look up to Combat Resume Fraud

Swati, Dr. Sneha, Dr. Anupam Bhatia

¹MCA Student, ³Asst. Prof., ²Associate Professor

Deptt. of Comp. Sc. and Application, Chaudhary Ranbir Singh University, Jind, Haryana, India

Abstract:

Fake resumes and false skills becoming a major problem in hiring. Employers often spend a lot of time checking whether a candidate's certificates and skills are real or not. In digital period, we have many options to get knowledge from multiple sources and get credit as a certificate or diploma. But a major problem comes that is the certificate and diploma are genuine or not. In Traditional system, it is difficult to check whether a certificate is genuine or not and it also take lot of time like 5 to 6 days/weeks. To overcome this problem, a blockchain based system is proposed that check the skill certificate are genuine or not. Blockchain is a decentralized, distributed ledger that store data or information in temper proof way. Blockchain system helps in universities, college, training, institutes and companies provide digital certificates and badges that are securely stored on Blockchain. Since if any records are added into Blockchain. It cannot be changed or deleted easily, the certificates remain safe or temper-proof. Each digital badge linked to candidate's profile and can be verified online by employer instead to contact that university, college etc. Smart contract is a Self -execution process That met automatic, when their condition is valid or satisfied. The proposed system helps to reduce resume fraud, increase trust between employer and candidates, also save verification time. It provides a secure way for people to share their verified skills anywhere in the worldwide

Index Term: Blockchain, Digital Badges, Credential Verification, Resume Fraud, Smart Contracts, Decentralized Identity, Hyperledger Fabric, Verifiable Credentials, Human Resources.

1. Introduction

In the digital period, the verification of educational qualification and professional skills has become increasingly complex due to rise multiple sources like to get certificate or diploma from online or offline mode. Which often delay in result and pay heavy cost and can still allow to use fake certificate. Blockchain technology provides a better solution. It helps to store data in a secure and tamper- proof way. It also uses smart contact to automatic issue and verifies certificates. This makes the verification process faster, safer and more reliable. Blockchain technology offers a decentralized, distributed ledger, smart contract, cryptographic hash and immutable solution for managing digital documents. It enables to storage the academic records, certificates, and digital badges in a tamper-proof way and automated verification [1].Certificate are issuance and verification framework using distributed ledger technology and crypto-graphic security [2]. Blockchain is a three -level based architecture that include smart contract, decentralized and block that improve transparency, scalability, and trust [3]. Smart contract is used to eliminate the third dependency that work secure, tamper –proof on academic credential with improve trust in real world application. By using blockchain technology it is easy to verify any documentation and reducing document fraud and ensuring the authenticity of digital certificates. It also help to improve the verification of academic degrees by providing a secure and reliable verification process[4].

All these terms defined as that:

Decentralized refer to system have no single authority, BITCOIN Blockchain works in a decentralized way. Immutable means once a transaction or data are added in block with a significant time no one can change it. On the other hand, if any authority community try to change then new time had recorded. All block has previous hash. If any unauthorized party try to enter the block and change the data, then block

breakdown. Cryptographic Hashing is the process of converting input data into a fixed size unique string (hash value) using a hash function. Any input data like (text, transaction, certificates) and gave a unique hash (e.g., A3F5X9as output). Smart contract is a self- executing digital agreement stored on a Blockchain. Hyper-ledger Fabric is an open source blockchain platform used to build secure business applications.

This research aims to develop a Blockchain-based skill certification verifier integrated with employer lookup functionality

1.1 Resume Fraud and Credential Integrity: A Growing Problem

In these days, a large part of population add false skill certifications and professional badges in their resumes. Many candidates add them to look more qualified in the hiring process. Employers usually consider these credentials while shortlisting, deciding salaries, and offering promotions. But the real problem is that to check whether the given information by candidates may real or fake. When the details or certificates mentioned in a resume by the candidates are false or exaggerated, it can lead employers to hiring the wrong person, causing financial loss to company or any organization, reduced productivity and damage the company career or reputation. All of this leads to hiring the wrong people, which results in wasted time or money.

As we read many types of Resume fraud and Credential fraud, but here we define most common type of Resume fraud:

Fake Certificates: – To get Certificates, diploma, degree from any course never complete the courses.

Expired or cancelled Credentials: – Some candidates show certificates that were once valid but are now expired still, they list them as active on their resumes.

Fake Diploma Mills: – To get certificates from fake or unrecognized institutes, that are not provide genuine knowledge.

Traditional systems spend lot of time to verify or check the document. HR department must contact university or colleges institutes to concern the certificates or diploma are done from there. A blockchain based verification system solves this problem by storing certificates securely and all to verify them instantly through online platform .

1.2 Limitations of Traditional Credential Verification Systems

Although conventional credential verification methods have been in use for many years, they suffer from a number of serious drawbacks. These issues not only reduce the efficiency of the process but also open the door to potential fraud. The key limitations are explained below:

Centralized Storage Risk: Most of certificates are stored in one and only single databases. If the system are failing, due to technical error, hacked or damaged, all important records may be lost, misuse or changed. That's why it is difficult to trust on traditional systems. Increases the chances of un-authorized access or manipulation, potentially putting the entire record at risk.

Time and Cost Involved: In traditional systems to check and verify the certificates or other documents can take lot of time even several days or weeks. HR/Employer often need to contact different-different organizations to verify the certificates are genuine and sometimes Pay verification fees and deadline with incomplete or delayed replies.

No Standard Format or Process: Different institutions use different format or method for verification.

This creates confusion and makes verification difficult, which leads to inconsistent verification results and confusion, particularly when comparing qualifications from various sources.

Dependence on Candidates: In many cases, HR/Employer usually depend on candidate to get their certificates. This increase risk of add fake or altered documents, incomplete, edited being submitted without being noticed. This makes possible abuse like editing certificates, hiding important information or submitting fake copies without being easily noticed.

The challenges clearly indicate a need for a modern solution. These problems can be addressed by blockchain based verification process which provides secure, large storage, quick verification, better transparency and increased trust. It provides a reliable model that can be beneficial for all parties involved.

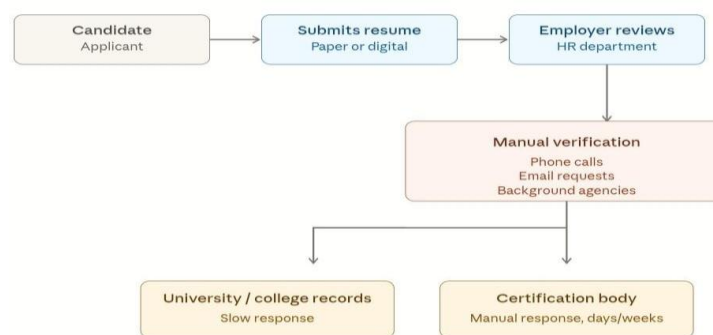


Figure1.2: How to check documents in traditional system

2. Need of Blockchain Technology

Traditionally, the issuing, storing and checking of skill certificates can be slow, risky and not completely transparent Blockchain changes this by giving us a secure digital record that cannot be tampered with. Once a digital badge is in the block chain. it stays there forever until the authorized person updates it. Each digital badge is digitally signed and displays who issued it to whom and when. It is a bare and truthful history.

Now training organizations can issue badges directly to a blockchain-based skills certification platform. The employer can then access the badges at any time via a simple portal. Automating the verification process saves both time and the need for manual checks. It creates trust between jobseekers, trainers and employers making the whole system more secure, transparent and efficient.

2.1 Potential of Blockchain Technology

“Blockchain technology has the power to revolutionize the way we issue and verify skill certificates. Get secure digital badges instead of old-fashioned place and pdf certificates. Skill Certification and PDF based credentialing systems attached to the blockchain through cryptography with verifiable digital badges on a blockchain based Skill Certification Verifier which are easy to verify and very hard to forge or tamper. A blockchain is a decentralized network. It means that it does not have a central authority or a central database. The verification data is stored securely in multiple authorized nodes, which improves reliability and prevents data loss or tampering. The credential is digitally signed and time stamped, creating a permanent and traceable record of the credential.

For instance, organizations could restrict the access to badge information via smart contracts on Hyperledger Fabric and only authorized users could have the right to view or change credential

information. Scanning a QR code or entering a badge ID into a verification portal lets employers easily confirm a candidate's qualification without revealing the candidate's personal information.

3. Related Work

As more organizations use more digital technology, secure skill certificate issuance and verification has become very important. However one of the major problems is the increasing number of fake or edited certificates and the absence of a common system that allows employers to quickly check whether certificates are real or not. Most skill certificates are still shared as PDF files, which can be copied, changed, or shared easily without verification from the original issuing organization, they have to chance to be fake and false.

Blockchain technology gives a better solution for this problem. It creates a digital record that cannot be changed easily, save on blockchain and helps issue and verify skill certificates safely. By using cryptographic hashing and a distributed ledger, blockchain allows to check certificates anytime without depending completely on the issuing organization [6].

Previous work has demonstrated that utilizing blockchain based certificate verification can alleviate the issues of fake documents, ownership issues, high verification costs, and slow verification processes [5]. Also, micro-credential systems based on blockchain have been developed by researchers to secure the issuance and sharing of digital badges and certificates between organizations [11]. The selective disclosure methods also allow the candidates to disclose only the skills relevant to the employers and keep other personal information private [10]. Some recent systems combine machine learning and blockchain to automatically verify the certificates and detect the suspicious or fake applications before they are reviewed by the recruiters [7]. It also work to improve the security and variation of graduation and academic certificates[12][13].

The enhancements demonstrate that a blockchain-based Skill Certification Verifier with employer lookup can increase trust in digital certificates, simplify the verification process and allow for faster and more accurate hiring decisions.

Blockchain technology provides a transparent and tamper-proof record system that helps in fraud prevention and improves trust in digital systems [8]. The features of transparency, auditability and decentralized trust make the verification of certificates more reliable. In traditional certificate systems you can replicate or modify files. The data of the certificate is stored on the blockchain thanks to a cryptographic hash, which makes it very difficult to change. A trusted system allows employers to readily verify a candidate's skills. But there are some issues in implementation of Block Chain. It requires the right technical infrastructure, the support of organizations issuing certificates and measures to maintain the consensus of the network and accuracy of data.

TABLE 1: Comparative Analysis of Related Studies on Blockchain-Based Credential Verification

Ref.	Author(s) / Year	Focus Area	Blockchain Platform	Smart Contracts	Employer Lookup	Limitations
[2]	G. Raju et al. (2024)	Framework for certificates issuances and verification.	Ethereum	Yes	No	No fraud-detection layer
[3]	Kakashi et al. (2024)	Three-layer model for credential verification	Hyperledger	Yes	No	Limited discussion on scalability
[5]	Cardenas-Quips & Pacheco	prototype for Degree verification	Generic blockchain	No	No	only a prototype, lacks employer-facing tool.
[6]	Rostami et al. (2023)	Review of existing certificate verification systems	Mixed	Mixed	No	only theoretical review, no practical solution
[8]	Saki et al. (2026)	Combining ML + blockchain for talent Identification	Not specified	No	Partial	Focus on ML, weak on badge standard
[10]	Gular et al. (2025)	comparative study on fraud detection methods	Mixed	Yes	No	No support for real-time employer verification.
[12]	Knowledge-Based Systems (2023)	use of Micro-credentialing in higher education	Hyperledger / Ethereum	Yes	No	Education-focused study, not employer-facing

Tabel2: Define the previous studies on a Blockchain Technology Parameter {R1: Decentralized, R2: Distributed Ledger, R3: Hashing SHA-256, R4: privacy and security, R5: Smart Contract, R6: Ethereum /Hyperledger}

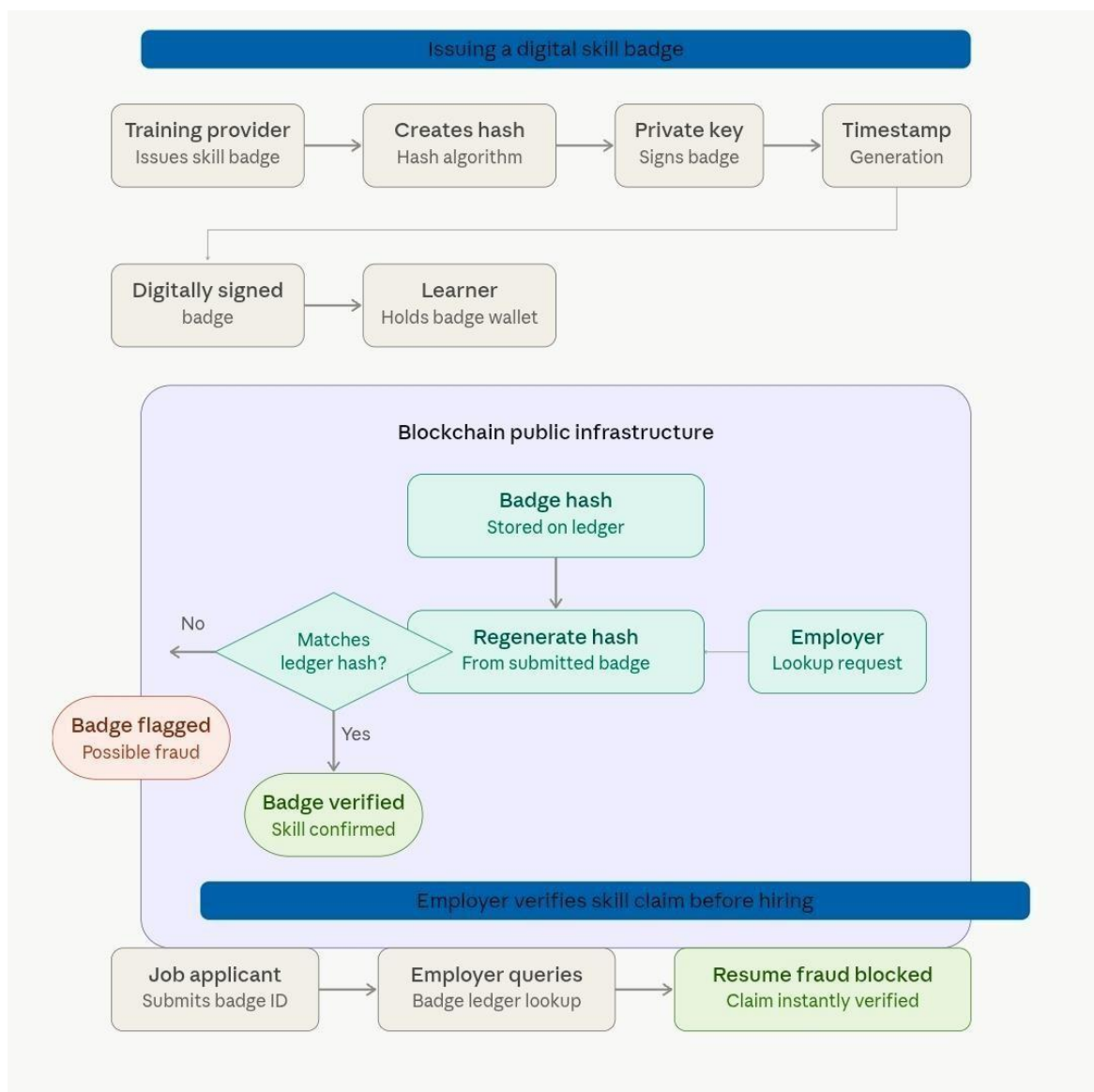
Author	Key Contribution	R1	R2	R3	R4	R5	R6
G. Raju et al.(2024)	Ethereum-based academic certificate anchoring with hash verification	✓	✓	✓	✓	---	✓
Kakashi et al.(2024)	Open Badges ecosystem study covering issuance, sharing, and employer trust	---	✓	✓	---	✓	✓
Cardenas Quips Pacheco &	Blockchain certificate verification overcoming ownership and cost challenges in education	✓	✓	✓	✓	---	---
Rostami et al. (2022)	Edu CTX platform for global higher education credential management on blockchain	✓	---	✓	✓	✓	---
Saki et. al. (2026)	Blockchain graduation certificate verification framework for authenticity in educational documents	✓	✓	✓	✓	✓	---
Gular et.al (2025)	DID-integrated professional credential system using Hyperledger for employer verification	✓	✓	✓	---	✓	-----
Knowledge-based systems (2023)	Degree verification system preventing transcript tampering	✓	✓	---	✓	✓	✓

4. Proposed Model

In a large quantity many company and organizations receive a large no of job applications. As a result, checking candidates manually has become a slow and difficult process. Companies and organizations need to directly contact universities, colleges, and training institutes to confirm that candidates' certificates are genuine. In this process, everything depends on the response from universities, colleges, and training centers, how quickly they respond, and sometimes additional charges may also apply. This increase hiring time and creates extra workload for HR department. In traditional certificate systems certificates are stored as normal digital files and therefore can be copied, edited or forged. This damages the trust between the employers and the candidates. The proposed model solves these problems using Blockchain (BC) technology and an employer lookup feature. The system allows training institutes, companies and other organizations to issue secure, digital skill badges to candidates. Candidates can retain these badges to display to employers at them

convenience. This enables employers to verify certificates quickly without having to contact training providers individually, saving them time and money. The system delivers security, authenticity, portability and fast verification. In the conventional certificate system, certificates are stored as normal digital files that can be copied, modified or forged. This erodes trust between employers and candidates. To solve these problems, the proposed model utilizes Blockchain (BC) technology and an employer lookup feature. The system will enable training institutes, companies and other organizations to issue secure digital skill badges to candidates. Candidates can securely store these badges and present them to employers when required. Employers can easily verify certificates without having to contact all training providers, saving time and cost. The system provides security, authenticity, portability and fast verification.

FIGURE 4: Blockchain-based model for skill certification verification with employer lookup.



4.1. Discussion

In this project, our main focus is to prevent resume fraud. Employers require genuine certificates to confirm that a candidate have real skills. Before hiring someone, companies usually verify the candidate's certificates, skill assessments, and other qualifications. This process is especially important for technical, medical, and safety-related jobs. Normally, employer contact training institutes or certificate providers to verify the certificates details. This process can take several days or weeks, especially when the institute is slow to reply or has closed. HR teams also spend lot of time to check certificates from different organization. Blockchain can solve this problem by making a secure and fast certificate verification system. In this system training institutes issue digital certificates in the form of badges. Each badge is protected using cryptography and that store on blockchain. Every hashing function has only a unique hash that stored the certificates details on blockchain, making secure. Employers can verify the certificates quickly by put badge ID. This helps to reduce verification time, regents' fake certificates, and allow candidates to safely carried their verified skills whenever they apply.

4.2 Analysis of the Proposed Solution

Blockchain (B.C.) is a secure, decentralized, and distributed ledger technology that uses hashing functions (SHA-256), end-to-end encryption, peer-to-peer networks, timestamps, and distributed storage to protect data. In the proposed skill certification verification system, these technologies work together to gives secure issue, store, and verify digital skill certificates. Hashing using SHA-256 (Secure Hash Algorithm) protects certificate information from unauthorized changes and editing. Encryption keeps data secure, and timestamping records when the certificate was issued. If any unauthorized party attempts to change the data, the modification time is also recorded. Distributed storage removes the need for a single central authority, making the system more reliable. Here explains the working of the proposed system:

Badge Generation and Encryption

It is the first step, where a trainer provides the digital badges after completion of courses. Generally digital badges including skill name, candidate identifier, issue date, and competency level, that are signed before storage. This protects the integrity of the credential and ensures compliance with data-protection requirements.

Hash Generation

After the certificates encryption (signing), a cryptographic hash (SHA-256) is generated for the badge. The hash function acts as a unique digital fingerprint of the credential(badges), this function are called here SHA-256. If any modification to the badge content results in a different hash value, small change of hash value creates a large difference, enabling immediate tamper detection.

Off-Chain Storage

Badge metadata and supporting documents can be fairly large. Therefore, the complete badge record is stored in an off-chain storage system such as IPFS or secure cloud storage. This provides better scalability without compromising on security.

Storing Hash on Hyperledger Fabric

In lieu of recording the complete badge on the blockchain, only the generated hash and the minimum amount of metadata of the badge are stored on the Hyperledger Fabric ledger. Once the peers of the network have validated it, the transaction becomes immutable and can later be used by employers to verify authenticity.

Smart Contracts (Chain-code)

Hyperledger Fabric automates badge registration, revocation and verification processes, through chain-code (smart contracts) The chain-code defines the rules around issuing badges, revoking badges on expiry or misconduct, the ability for employers to query and audit logs. This automation reduces human intervention, and builds trust among issuers, candidates and employers.

Identity Management through MSP

The Membership Service Provider (MSP) of Hyperledger Fabric manages the identities of training providers, candidates and employers. All participants are given a digital certificate from a trusted Certificate Authority. The MSP ensures that only authenticated issuers can mint badges, and only registered employers can do lookups. Every participant will receive a digital certificate issued by a trusted Certificate Authority. The MSP ensures that only legitimate issuers can issue badges and only registered employers can do look ups.

Employer Lookup Portal

The employer lookup portal is a web-based interface that a recruiter or HR system can use to enter a candidate's badge ID, QR code or shareable verification link. The portal queries the blockchain ledger, recomputes the badge hash and returns a real-time validity status (valid, expired or revoked) and the identity of the issuing authority without the employer having to contact the issuer directly.

Timestamping

All blockchain transactions such as issuance and revocation of badges and lookup events of employers are automatically timestamped. The timestamp tells you when a badge was created, modified or queried – giving you a full audit trail for compliance and accountability.

TABLE 3: Workflow of Figure 4: – Blockchain-Based Model for Skill Certification Verification

Step	Process	Description
1	Badge Issuance	Training provider, university, or certifying body issues a digital badge containing skill metadata, candidate ID, and issue date.
2	Hash Generation	A cryptographic hash (SHA-256) of the badge data is generated, acting as a tamper-evident fingerprint.
3	On-Chain Anchoring	The hash and minimal metadata are recorded on the blockchain ledger; the full badge is stored off-chain (e.g., IPFS).
4	Smart Contract Registration	Chain-code/smart contract registers the badge, candidate identity, and issuer credentials, enforcing access rules.
5	Employer Lookup Request	An employer submits a verification request through the lookup portal using the candidate's badge ID or QR code.
6	Automated Verification	The smart contract recomputes the hash and compares it with the on-chain record to confirm authenticity instantly.
7	Result & Audit Logging	The verification result (valid/invalid/revoked) is returned to the employer and logged immutably for audit purposes.

4.3 Benefits of the Proposed Model

This section describes the benefits of the proposed method for candidates, training providers and employers. The following in particular presents the benefits that the proposed model would bring to each stakeholder group.

Benefits for Employers:

Only cryptographically verified skill data is checked through the blockchain lookup portal Verification results are provided instantly, reducing time-to-hire significantly.

HR teams do not need to spending lot of time o contact different-different training providers manually.

Easily identify fake/expired certifications before offering for recruiters.

All badge transactions are stored on the blockchain so verification records cannot be lost, edited, or changed.

Multiple lookups for authorized employers at any time in the hiring lifecycle (background checks, promotions, audits).

No need to maintain a separate internal database of certificate authenticity records.

Advantages for Candidates and Training Providers

Candidates have own portal to verifiable digital badges that can be shared with any employer at any time or place.

All certifications and skill assessments can be managed in a single digital badge wallet, no need to take documents paper everywhere.

Training providers and certifying bodies can securely issue, store, and stand behind authenticated credentials.

Blockchain transactions ensure that issued badges are permanently available and cannot be lost. Skill badges can be shared and verified at any time from authorized devices.

The system can be easily integrated to revoke outdated or fraudulently obtained badges, keeping records current.

5. Implications of the Findings

Based on the proposed framework, Table 3 outlines the implications of a blockchain-based Skill Certification Verifier with employer lookup, followed by the associated challenges and future directions.

TABLE 4: Implications of Findings for Blockchain-Based Skill Certification Verification

Dimension	Implication	Challenge	Future Direction
For Job Seekers	Candidates can verify their Skills are independently and employer also used the same certificates.	People need basic digital knowledge and must know how to use digital wallets,	Mobile-first badge wallets with biometric access
For Employers	Employer can fast verify the certificates, that decrease the resume fraud and save hiring time.	Difficult to connect with existing ATS/HR systems	API-based plug-ins for major HR platforms
For Training Providers	Stronger brand trust as badges cannot be forged.	Moving from old paper to digital badges can be costly.	Standardized badge schemas (e.g., Open Badges + blockchain)
For the Ecosystem	It reduced credential fraud strengthens, increase trust in the job market.	Cross-chain blockchain need to work together properly	Consortium blockchains shared across industries and regions

6. Conclusion and Future Work

To improve the issuance and verification of skill certifications and reduce resume fraud, this study proposes a blockchain-based Skill Certification Verifier that enables employers to instantly look up and validate digital skill badges issued to candidates. The proposed system reduces the risk of credential forgery, fabricated certifications, and misuse of fake training records. While it provides enhanced security, authenticity, portability, and instant employer-side verification. One of the main advantages of the suggested model is that all information required for validating a candidate's skill claims is securely maintained on the blockchain alongside encrypted off-chain storage. Employers do not need to repeatedly contact the issuing training provider to confirm the authenticity of a certificate; they only need to verify that the current hash of the badge matches the hash stored on the blockchain through the lookup portal. If both values match, the credential is considered original and unaltered. The proposed model can initially be implemented with selected training providers and recruitment platforms and later expanded into a shared, cross-industry verification network. Future work the system can be augmented with smart contracts for fully automated badge issuance and revocation. Artificial intelligence can be integrated to detect fabricated resumes and suspicious application

patterns more effectively to complement the blockchain based verification layer also add zero-based knowledge, mobile automation and cross-chain validation.

References

- [1] T. Rama Reddy, P. V. G. D. Prasad Reddy, R. Srinivas, et al., “Blockchain-based framework for skill credential management,” in Proceedings of Springer Conference, 2021.
- [2] G. Raju, L. R. Bhupali, A. Thud mela, et al., “Blockchain-based certificate issuance and verification framework,” Science Xcel Journals, 2024.
- [3] F. Kakashi, H. Sinopec, A. Lama, and V. Nazari, “A three-layer Blockchain architecture for secure credential verification,” Online Journals, 2024.
- [4] M. A. Cardenas-Quips and A. Pacheco, “Prototype system for degree verification using Blockchain,” Nature, 2025.
- [5] Rostami, A., Dalai, F., Athanasios, V., & Rusedski, A. (2023). A Systematic Literature Review on Blockchain-Based Systems for Academic Certificate Verification. IEEE Access.
- [6] Caldarella, G., & Ellul, J. (2021). Trusted Academic Transcripts on the Blockchain: A Systematic Literature Review. Applied Sciences, 11(4), 1842.
- [7] Saki, S. M. A. I., et al. (2026). Blockchain and Machine Learning in Talent Acquisition: A Review on Credential Verification and Recruitment Optimization.
- [8] Cai, Y., & Zhu, D. (2016). Fraud Detections for Online Businesses: A Perspective from Blockchain Technology. Financial Innovation.
- [9] Gular, P., et al. (2025). Blockchain-based Academic Certificate Fraud Detection: A Comparative Review and Combined Framework.
- [10] Selective Disclosure in Digital Credentials: A Review. (2024). ScienceDirect.
- [11] Blockchain-based Micro-credentialing System in Higher Education Institutions: Systematic Literature Review. (2023). Knowledge-Based Systems.
- [12] S. Suman and A. Bhatia, “Blockchain based graduation certificate verification framework. Ensuring security and authenticity in educational documents,” AIP Conferene Proceedings.
- [13] S. Suman and A. Bhatia, “Revolutionizing Education: A comprehensive Review of Blockchain Technology’s impact and potential in the Education Sector,” Proceedings of the 1st International conferene on Cognitive & Cloud Computing