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Blockchain Approach for Project Management Framework- A Survey

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Abstract : Collaboration is a trust demanding and risky process especially when there is a need for financial security and data confidentiality. The proposed project is an application that provides a secure and transparent platform for collaboration between owners and collaborators, ensuring that payments are released only upon successful completion of the deliverables. Collaborators can sign up for the application using their verified certificates, which are stored on the blockchain network. Owners can hire collaborators and assign them deliverables, which are locked with the corresponding payment amount. Upon successful completion of the deliverables, the funds are released to the collaborator's account. The application is designed to enhance trust between owners and collaborators by providing a transparent and tamper-proof platform for collaboration. The use of blockchain technology will make all transactions secured and unalterable, providing a high level of security for all parties involved. The proposed application has the potential to revolutionize the way collaborations are managed, providing a secure and efficient platform for collaboration while reducing the risk of fraud and mismanagement.

IndexTerms **– blockchain, smart contract, transparency, verification, decentralization.**

I. INTRODUCTION

Blockchain technology is characterized by a ledger that is both distributed and decentralized. It has the potential to revolutionize various industries, including education and project management. The use of blockchain in education has gained attention due to its ability to provide a secure and tamper-proof platform for verifying educational records and certificates. Blockchain can be used to create a digital record of academic achievements, which can be easily and quickly verified by anyone who has access to the blockchain network. This can reduce the time and cost associated with verifying educational credentials, while also improving the security and privacy of these credentials.

Similarly, the use of blockchain in project management has shown promise in providing a decentralized and transparent platform for collaborating and managing projects. Traditional project management systems are often centralized and rely on a single authority to manage the project. This can create inefficiencies, delays, and a lack of transparency, particularly in collaborative projects that involve multiple stakeholders. Blockchain-based project management systems can address these challenges by providing a decentralized platform for collaboration, which allows all stakeholders to have equal access to project information and resources.

One of the key challenges in project management is ensuring the timely delivery of high-quality deliverables. To address this challenge, some blockchain-based project management systems have incorporated the concept of fund locking, where project owners can lock some currencies as incentives for collaborators to complete their deliverables on time and with high quality. Once the deliverables are completed, the locked funds are released to the collaborators. This creates a strong incentive for collaborators to complete their deliverables on time and with high quality, which can improve the overall success of the project.

The literature survey for this project can focus on several areas related to blockchain-based education and project management systems with fund locking mechanisms. Firstly, the survey can explore the current state-of-the-art in blockchain-based education systems and their potential benefits. This can include a review of the different types of blockchain-based education systems that exist, such as those that focus on verifying academic credentials or those that aim to create a decentralized platform for education.

II. LITERATURE SURVEY

The use of blockchain technology for educational certificates verification has been explored by several researchers [1, 4, 6, 7]. [1] proposed a framework that leverages blockchain technology to create a secure and decentralized system for verifying the authenticity of educational certificates. The system is designed to eliminate the need for a centralized authority to verify the certificates and ensure the security and privacy of the users' data. The framework uses a smart contract-based system that enables the automation of the verification process, making it faster and more efficient.

In [4], the authors propose a certificate validation system that uses the Ethereum blockchain and smart contracts to validate certificates. The system uses an SHA-256 algorithm to create a unique certificate hash, which is stored on the blockchain. The hash

can be used to verify the authenticity of the certificate. The authors also propose a consensus algorithm that uses a hybrid proof-of-work and proof-of-stake mechanism to ensure the security and reliability of the system. In [6], a system for verification and validation of certificates using blockchain and biometric authentication is proposed. The system uses a combination of blockchain and biometric authentication to ensure the authenticity of certificates. The authors propose a process for certificate validation that involves capturing the biometric data of the certificate holder and storing it on the blockchain. The system also uses smart contracts to automate the verification and validation process.

Unlike [4] and [6] which focus solely on certificate verification, [7] also considered the safety aspect of certificate management. It manages the revocation and reissuance of the certificates through the use of blockchain. When a certificate is issued, it is stored on the blockchain with a unique hash. If there is a need for revocation, a revocation transaction is added to the blockchain. In the case of reissuance, a new certificate is issued with a new hash value, and the old certificate is revoked by adding a revocation transaction to the blockchain. The new certificate is then stored on the blockchain and can be used for verification. This process ensures that all revoked certificates are permanently recorded on the blockchain, and new certificates can be easily issued and verified.

Blockchain technology has also been used to improve payment systems in the construction industry [2, 10, 11]. [2] proposes a smart contract-based blockchain framework for construction payment automation. The focus is on providing an automated payment system for construction projects to reduce payment delays and disputes. The paper emphasizes the payment freezing and disbursement cycle, which is a critical challenge in the construction industry. [10] proposes a blockchain-based smart contract for smart payment in construction. However, the focus is on the construction supply chain, where different parties such as contractors, suppliers, and clients can use the platform to conduct secure and transparent transactions. The paper also addresses the challenges of payment freezing and disbursement cycle but in the context of supply chain transactions.

In [11] proposed a blockchain-based solution for payment issues in construction supply chains, which ensures transparency and reduces payment disputes. In the proposed mechanism, when a payment dispute arises, the parties involved can initiate a dispute resolution process by submitting their claims and evidence to the smart contract. The smart contract then automatically triggers an arbitration process, where a neutral third-party arbitrator is selected and the dispute is resolved based on the evidence provided by the parties. The arbitrator's decision is recorded on the blockchain and automatically executed by the smart contract, ensuring that the payment is distributed according to the decision. This mechanism provides a transparent and secure way to resolve payment disputes, reducing the risk of fraud and ensuring fair payment distribution.

[3] proposed a payment scheme is based on a delay-tolerant networking protocol that enables communication between nodes even in scenarios where network connectivity is intermittent. The proposed scheme uses smart contracts on the Ethereum blockchain to enable secure and transparent transactions. The authors propose a payment model that enables users to make payments in advance, which are held in an escrow account until the service is delivered. Once the service is delivered, the payment is released to the service provider.

Blockchain technology has also been used to improve peer-to-peer money transfer systems [8]. The authors describe their proposed system, which involves using a cryptocurrency as the medium of exchange and a blockchain as the underlying technology. They detail the various components of the system, including the digital wallet, the blockchain network, and the consensus mechanism. They also discuss the security features of the system, such as encryption and multi-factor authentication, which help to protect users' financial information. The system is evaluated in terms of security, scalability, and efficiency

[5] proposed a decentralized freelancing system that uses blockchain technology to ensure trust and transparency between freelancers and clients. The smart contract in the system specifies the terms and conditions of the work, and the payment is released only when the work is completed and accepted by the client. The platform uses a reputation system to maintain the quality of work and ensure that the freelancers are reliable. The proposed system aims to solve the problems of traditional freelancing platforms, such as the lack of trust and transparency, delayed payments, and disputes over work quality. The paper provides a detailed description of the proposed system and its components, and also presents a prototype implementation of the system. The evaluation of the prototype shows that the proposed system can provide a reliable and transparent freelancing platform that benefits both the clients and freelancers.

[12] proposes a new system for conditional payments using blockchain technology. This system operates through the utilization of smart contracts, which are contracts that can execute themselves and have their terms and conditions written directly in code. The smart contract is programmed to automatically execute the payment when certain conditions are met. These conditions could be anything from the delivery of goods to the completion of a task. The paper proposes the use of a new type of cryptocurrency called "smart money," which is programmable money that can be automatically transferred and executed based on predefined conditions. This would allow for more efficient and secure transactions, as well as the automation of certain financial processes.

Blockchain technology has also been used to improve certificate authentication and verification [9, 13, 15, 17, 18]. [9] proposes a peer-to-peer money transfer system using blockchain technology and cryptocurrency. The system allows users to transfer funds to each other without the need for a third-party intermediary, such as a bank. [17] proposes a blockchain-based system for certificate verification and generation of transcripts. It works by creating a unique digital identity for each student, which contains their personal information, academic records, and certificates. This identity is then stored on a blockchain, which ensures its immutability and transparency. Whenever a student applies for a job or further education, the employer or institution can request access to the student's digital identity to verify their academic credentials. The paper explains how the use of blockchain technology ensures the authenticity and integrity of the student's digital identity, as it eliminates the possibility of tampering with the records. Additionally, the system generates an immutable transcript for each student, which contains their academic records and certificates. This transcript can be shared with potential employers or institutions, providing a secure and transparent method for verifying the student's credentials. [18] proposes a system that combines biometric authentication and blockchain to verify both identity and educational certificates of

students. The proposed system uses biometric data to verify the identity of the student and store the encrypted data on the blockchain, which ensures the immutability and security of the data.

[19] proposed a multi-currency exchange and contracting platform that uses blockchain technology to enable efficient and secure multi-currency transactions. explored the concept of decentralized society and how blockchain technology can be used to enable Web3's soul, which emphasizes the importance of decentralization and community governance in the digital age. The paper explores the potential for decentralized social organization using blockchain technology and other Web3 tools. The paper argues that decentralized systems have the potential to create a more equitable and democratic society, by removing the need for centralized institutions and allowing individuals to interact with each other directly. The authors explore the limitations of current decentralized systems, including issues with scalability, governance, and economic sustainability, and propose a set of principles for building a truly decentralized society.

Finally, [20] introduces a new consensus protocol that utilizes smart contracts to allow crowd members to vote on the proposed tasks and ensure that the tasks are completed correctly. The paper provides a detailed description of the proposed protocol, including the structure of the smart contracts and the algorithms used for consensus. The authors then use the SPIN model checker to formally verify the proposed consensus protocol, ensuring that it meets specific correctness properties. The paper also includes experimental results that demonstrate the effectiveness and scalability of the proposed protocol.

III. LITERATURE SUMMARY

SL.No	Citation	Year	Methodology/Algorithm used	Remarks
1	Omar S. Saleh, Osman Ghazali, and Muhammad Ehsan Rana. "Blockchain Based Framework for Educational Certificates Verification."	2020	The authors propose a blockchain-based framework for educational certificate verification that uses smart contracts to store certificate information on the blockchain. The system includes a verification node that can query the blockchain to verify the authenticity of certificates and ensure that they have not been tampered with. The framework was implemented using the Ethereum blockchain, and the authors conducted experiments to evaluate its performance and scalability.	The proposed framework aims to improve the verification process by eliminating intermediaries and increasing the security and transparency of the verification process
2	H. Luo, M. Das, J. Wang, and J.C.P. Cheng. "Construction Payment Automation through Smart Contract-based Blockchain Framework."	2019	The authors propose a framework that can securely manage payment data and automate payment disbursement to different stakeholders in the construction process using smart contracts. The framework is designed and tested using Ethereum, a popular blockchain platform, and the authors conducted experiments to evaluate its performance and scalability.	The proposed framework aims to improve the transparency, efficiency, and security of construction payment processes.
3	Yining Hu, Ahsan Manzoor, Parinya Ekparinya, Madhusanka Liyanage, Kanchana Thilakarathna, Guillaume Jourjonand Aruna Seneviratne. "A Delay-Tolerant Payment Scheme Based on the Ethereum Blockchain "	2019	The authors designed a delay-tolerant payment scheme that is based on the Ethereum blockchain. This payment scheme uses smart contracts to facilitate transactions between two parties.	The paper proposes a payment scheme that can be used in situations where internet connectivity is intermittent or unreliable. The authors use the Ethereum blockchain to implement the payment scheme, which allows for secure and decentralized transactions.
4	Bejugam Sanjana, Challa Naga Narasimha Reddy, and Choppadandi Aravind. "Blockchain Based Certificate Validation."	2022	The methodology involves creating a unique hash for each certificate and storing it on a public blockchain network, making it immutable and tamper-proof. The system also includes a user interface that allows users to verify the authenticity of certificates by entering the certificate ID on the blockchain	The proposed system aims to increase the security and transparency of the certificate validation process and eliminate the need for intermediaries.

			network. The validation process involves retrieving the certificate hash from the blockchain and comparing it with the hash generated from the certificate's original data.	
5	Mihir Gandhi, Priyam Shah, Devansh Solanki, and Mihir Shah. "Decentralized Freelancing System - Trust and Transparency."	2019	The paper proposes a decentralized freelancing system that uses blockchain technology and smart contracts to ensure trust and transparency between freelancers and clients. The system utilizes a reputation system and a dispute resolution mechanism to maintain trust and fairness in the freelancing process.	Proposed a decentralised freelancing system based on blockchain to enhance the hiring process and payment process
6	Rohan Hargude, Ghule Ashutosh, Abhijit Nawale, and Sharad Adsure. "Verification and Validation of Certificate Using Blockchain."	2021	Achieving verification and validation using a combination of biometric identification and blockchain technology, The authors present a detailed system architecture and evaluate the system's performance using simulations.	The paper proposes a blockchain-based system for verifying and validating educational certificates using biometric identification. However, further research is required to evaluate the system's effectiveness in a real-world setting.
7	Sri Samanthula Bhuvaneswari, Rakhi Kumari, and Ch. Pavangeethanjali. "CertiSafe: A Blockchain Based Certificate Validation and Safety System."	2022	The paper proposes a blockchain-based system called CertiSafe for certificate validation and safety. The authors describe the system's architecture and implementation using Ethereum smart contracts and Solidity programming language. The system uses biometric authentication and a decentralized blockchain database for secure and tamper-proof certificate storage.	The paper proposes a blockchain-based system called CertiSafe for ensuring the authenticity and safety of certificates. The authors evaluate the system's performance using a prototype implementation and discuss its potential benefits, including increased efficiency and reduced fraud
8	Harshad Hakke, Abhishek Bharati, Akshay Ranit, and S R Khonde. "Blockchain Based Payment Method for Secure Transactions."	2022	The authors describe the system's architecture, which includes a decentralized blockchain database, a mobile application for transaction initiation, and a smart contract for payment processing. The payment process is executed using a two-phase commit protocol, ensuring atomicity and consistency.	The paper proposes a way to make payments using blockchain technology, with smart contracts and Solidity. The prototype implementation was found to be secure and efficient.
9	Shashidhar M.R. "Blockchain based Peer to Peer Money Transfer using Cryptocurrency Digital Wallet."	2020	The paper proposes a blockchain-based peer-to-peer (P2P) money transfer system using a cryptocurrency digital wallet. The system uses smart contracts to enable secure and transparent transactions without intermediaries.	The proposed system along with the pre-existing features of blockchain, also includes features such as multi-signature and two-factor authentication for enhanced security.
10	Liupengfei Wu, Weisheng Lu, and Jinying Xu. "Blockchain-based smart contract for smart payment in construction: A focus on the payment freezing and disbursement cycle."	2022	The paper proposes using a blockchain-based smart contract to manage payment freezing and disbursement cycles in construction projects. The smart contract would automatically release payments to contractors based on predetermined milestones achieved and verified by stakeholders.	The authors discuss a proposed framework for improving payment security, efficiency, and transparency in construction projects.
11	Samudaya Nanayakkara, Srinath Perera, Sepani Senaratne, Geeganage Thilini Weerasuriya, and Herath	2021	The paper proposes a blockchain-based payment system for the construction industry to solve payment issues. The authors	Paper does a breakdown and analysis of the construction industry's payment process to

	Mudiyanselage Nelanga Dilum Bandara. "Blockchain and Smart Contracts: A Solution for Payment		suggest the use of smart contracts for the payment process, which will be automated and transparent.	identify the pain points and potential solutions.
12	Ingo Weber and Mark Staples. "Programmable money: next-generation blockchain-based conditional payments."	2022	Paper proposes the concept of "programmable money" through smart contracts, enabling automated and conditional payments. The paper identifies various use cases for programmable money, including supply chain financing, insurance, and crowdfunding	The authors discuss the challenges and opportunities for implementing programmable money and bring out the importance of standardization and interoperability across different blockchain platforms.
13	Swathi H.C and Dr. H.P Mohan Kumar. "SECURE BANK TRANSACTION USING BLOCKCHAIN."	2020	The methodology used involves a combination of blockchain technology, cryptography, and consensus algorithms to ensure the security and privacy of bank transactions. The authors propose a permissioned blockchain network and utilize smart contracts to automate and enforce the rules and regulations of the bank.	The working system as means of validation is tested using various parameters such as transaction speed, security, and scalability.
14	Xianyun Ge. "Smart Payment Contract Mechanism Based on Blockchain Smart Contract Mechanism."	2021	Paper utilizes smart contracts to automate the payment process in a secure and transparent manner. The methodology involves the design and implementation of a blockchain-based payment system using Solidity and the use of smart contracts to establish the rules and conditions for payment execution	The system also includes a user interface for easy interaction with the smart contracts. The proposed mechanism aims to improve the efficiency, security, and transparency of payment processes.
15	Sifat Nur Billah, Farjana Hossain, Rehana Pollob, Nahid Murad Abir, Afsana Zaman Zarin, and Dr. M.F. Mridha. "Blockchain Based Architecture for Certificate Authentication."	2022	The methodology involves creating a smart contract for each certificate, which is then deployed on the blockchain network, and users can verify the authenticity of the certificates by querying the blockchain.	The system uses Ethereum, smart contracts, and the blockchain network to provide a tamper-proof and decentralized solution. This system could reduce fraud and ensure the credibility of certificates.
16	E. Glen Weyl, Puja Ohlhaver, and Vitalik Buterin. "Decentralized Society: Finding Web3's Soul."	2022	This Blockchain-based architecture for certificate authentication uses Hyperledger Fabric framework for designing and implementing the system. The methodology involves the creation of a smart contract for certificate verification, integration with a mobile application for user authentication, and use of an API to interact with the blockchain network.	The crux of the paper involves creating a smart contract for each certificate, which is then deployed on the blockchain network, and users can verify the authenticity of the certificates by querying the blockchain.
17	Ravi Singh Lamkoti, Devdoot Maji, and Hitesh Shetty. "Certificate Verification using Blockchain and Generation of Transcript."	2021	The system creates a web-based system that can securely store academic certificates on the blockchain. The system uses the Ethereum blockchain platform to create and manage smart contracts for secure and tamper-proof storage of certificates. The verification process involves scanning a QR code to retrieve the certificate data from the blockchain and generating a transcript for the candidate.	The solution aims to overcome the challenges of traditional certificate verification systems, such as fraud and data manipulation, by leveraging the immutability and security features of blockchain technology.
18	Prof. Jignasha Dalal, Meenal Chaturvedi, Himani Gandre, and Sanjana Thombare. "Verification of Identity and		This paper discusses the use of biometric authentication and blockchain technology to verify the identity and educational	The system is designed to provide a secure and transparent way to verify student identity and

	Educational Certificates of Students Using Biometric and Blockchain."	2020	certificates of students. The process starts with the enrolment of a student's biometric data and educational records into a centralized database. This data is then hashed and stored on a blockchain network. When the student needs to verify their identity or educational certificates, they provide their biometric information, which is authenticated against the previously enrolled data.	educational certificates, while also protecting against fraud and data manipulation.
19	Tobias Adrian, Federico Grinberg, Tommaso Mancini-Griffoli, Robert M. Townsend, and Nicolas Zhang. "A Multi-Currency Exchange and Contracting Platform."	2022	The paper proposes a multi-currency exchange and contracting platform based on blockchain technology. It also involves building a decentralized platform with a standardized protocol for the exchange of various cryptocurrencies and smart contract execution. The platform ensures privacy and security of transactions through the use of cryptographic techniques and a distributed ledger system.	The paper also highlights the importance of regulatory compliance and proposes a governance model for the platform
20	Hamra afzaal, muhammad imran, muhammad umar Janjua and sarada prasad gochhayat "Formal Modeling and Verification of a Blockchain-Based Crowdsourcing Consensus Protocol"	2021	The methodology of the paper involves the development of a formal model of a blockchain-based crowdsourcing consensus protocol using the Z notation. The model is then subjected to formal verification using the Z/EVES tool, which verifies the correctness of the model with respect to the specified properties. The results of the verification are used to refine the model and ensure that the protocol is secure and efficient.	This paper presents a formal model of a crowdsourcing consensus protocol based on blockchain technology, and verifies its correctness using a model checker. The protocol involves multiple phases such as proposal, voting, selection, and payment, and the authors use the Alternating-time Temporal Logic (ATL) to represent the strategic interactions among the different entities involved.

IV. CONCLUSION

Blockchain technology has emerged as a promising solution in various domains, including education, construction, finance, payment systems, and certificate validation. The reviewed papers demonstrate the potential of blockchain to provide decentralized, secure, and transparent systems that are resistant to tampering and fraud. In the context of the project management system, the use of blockchain technology for certificate validation and payment release can enhance the trust and transparency among the collaborators and the owner. The proposed project aligns with the concepts discussed in several papers, including, [4] on blockchain-based certificate validation, [8] on blockchain-based payment methods, and paper [11] on blockchain and smart contracts for payment in construction supply chains. The proposed system can be further improved by leveraging the ideas discussed in [12], which introduces the concept of programmable money and conditional payments using blockchain-based smart contracts. Additionally, [15] provides insights into the use of blockchain-based architecture for certificate authentication, which can enhance the security and validity of the certificates used by the collaborators. Overall, the reviewed papers suggest that the proposed project has the potential to leverage the benefits of blockchain technology to create a secure and transparent collaboration and payment system. The proposed system aligns with the current trends in the blockchain domain and can contribute to the growth and adoption of blockchain technology in project management systems.

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