Published by :
https://www.ijert.org/
An International Peer-Reviewed Journal

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 14, Issue 10, NCREHAASTE - 2026

Leveraging Artificial Intelligence and Blockchain for Greater Transparency and Security in Financial Transactions

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***Abstract*—The use of AI and blockchain has brought about a new era in improving transparency and security in financial transactions. Blockchain technology, which is decentralized and tamper-proof, provides a secure and transparent way to record transactions. Each transaction is recorded on a distributed ledger, which significantly reduces the risk of fraud and manipulation. On the other hand, AI algorithms help identify suspicious activities through data analysis and pattern recognition, supporting financial institutions in real-time monitoring and risk assessment. This research paper explains how AI and blockchain together enhance the integrity of financial transactions, build trust for customers, and simplify regulatory compliance. We also discuss the challenges of implementing these technologies and potential solutions to improve their use in the financial sector.**

***Index Terms*—Artificial intelligence, blockchain, financial transactions, transparency, security.**

INTRODUCTION

Basically, things like AI and Blockchain are making big changes in the financial world.AI is helping with the things like catching fraud and giving people personalised financial advice. Blockchain is making transactions more secure and transparent. (O. Bouachir, M. Aloqaily, F. Karray, and A. Elsaddik, 2022). New technologies are being used to fix problems in the financial world, like fraud, inefficiency, and lack of transparency in how money moves around. (Badidi, E "Edge 2022"). The world of online communication and the emergence of digital platforms have necessitated the need for secure security measures and transparent operational routines in the execution of transactions. In the modern day and fast-changing digital world, the security of financial services is important for the protection of personal information, transactions, and funds. The increase in the number of digital transactions and the new threats that are arising have been pushing banking institutions to adopt more and revolutionary security and risk reduction mechanisms. One of the mechanisms will be the implementation of Artificial Intelligence (AI) using blockchain to enhance the security models in financial services. (Abdel-Rahman, 2023; Kafi & Akter, 2023; Muhammad et al., 2022). Artificial intelligence, a subset of computer science, is the simulation of human intelligence processes by machines. Learning, reasoning and self-correction, to name a few, are a few of the cognitive processes that AI can emulate to carry out tasks that require human-like intelligence. The combined application of machine learning, natural language processing and computer vision, that is, the capacity of a computer to understand and interpret human language input and image input, enables robots to perceive and create patterns and autonomously make informed decisions. (O. Bouachir, M. Aloqaily, F. Karray, and A. Elsaddik, 2022). Blockchain is like a secure, shared record of every transaction that's ever happened. It's like a public ledger that everyone can see, but no one can change, making it very trustworthy. This ledger is distributed across numerous computers. Each block is a record of a transaction, and they are all linked together permanently. So, once a lock is added, ts's there forever, and that's why it's called a 'Blockchain'. (F. Karray, A. Elsaddik, M. Aloqaily, and O. Bouachir (2022).

Blockchain is really good at keeping transactions safe because it's completely transparent, meaning everyone can see what's happening, and it's impossible to change anything once it's recorded. Plus, it's Decentralised, meaning no single person or organisation controls it, which makes it even more secure. (Korteling et al. (2021), Sarker (2022), Dellermann et al. (2019).AI is really good at looking through tons of data to find patterns and spot suspicious activity, like fraud. It's like having a super smart detective who can analyse all the clues and figure out if something fishy is going on. (Girija et al. (2023); Tyagi, Aswathy, & Abraham (2020); Shinde, Seth, & Kadam (2023). Blockchain acts as an effective method for recording and authenticating transactions, serving to record and keep financial data. (Girija et al., 2023; Tyagi, Aswathy & Abraham, 2020; Shinde, Seth & Kadam, 2023). Blockchain is a technology that uses AI to make financial transactions more secure, transparent, and reliable. It's like having a smart system that helps keep track of everything, makes sure everything is open and honest, and makes sure things work the way they are supposed to. It will change the way financial services are delivered and utilized. This paper explores how we can use blockchain technology to make financial transactions more secure and transparent. It's all about using blockchain's special features to make money transfers safer and easier to track.

INTEGRATION OF AI AND BLOCKCHAIN

Blockchain and artificial intelligence (AI) create a powerful combination capable of revolutionizing the realm of financial security. (Heri, H. Y. N. 2024). Acceleration and improvement of verifying processes in blockchain networks is one of the opportunities of implementing AI within them. (Heri, H. Y. N. 2024). Transaction verification can be improved with the use of AI while appropriate data analysis may facilitate the detection of fraudulent activities hidden within blockchain systems. (P. Kumar, R. Kumar, S. Garg, G. Kaddoum, A. N. Islam, and Z. Han (2023). The synergy of combining blockchain with AI results in their mutual significant benefits. The use of blockchain provides AI with the possibility of analyzing a large amount of information. (P. Kumar, R. Kumar, S. Garg, G. Kaddoum, A. N. Islam, and Z. Han (2023). Banks may leverage this technology in developing solutions to respond to several security challenges, including fraud detection, identity verification, risk management, and regulatory compliance. (P. Kumar, R. Kumar, S. Garg, G. Kaddoum, A. N. Islam, and Z. Han (2023). AI-driven fraud detection systems employ machine learning in real-time to assess transaction data looking for irregular activities, patterns, and possible fraud. (Ranne, Choudhary, & Rane, 2023; George, 2023). Businesses can improve security and transparency of the whole financial system by embedding these solutions into blockchain-based

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International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
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transaction networks. (Olubusola Odeyemi and colleagues, 2024) AI-driven identity verification systems use biometrics and natural language processing to verify users and prevent unauthorized access. (Olubusola Odeyemi and colleagues, 2024). Financial institutions can improve security, simplify client on boarding, and protect sensitive information from unauthorized access by combining these technologies with blockchain-based identity management systems. AI-driven systems for regulatory compliance and risk management can analyse large datasets, detect compliance issues, and ensure regulatory compliance.

Financial organizations can enhance transparency, auditability, and control through the use of such solutions, integrated with blockchain-based reporting systems. This will improve compliance and confidence inside the financial ecosystem. (Olubusola Odeyemi and colleagues, 2024). Secure blockchain architecture and AI predictive abilities will merge in a resilient, transparent, and safe financial transaction system. (Y. Zhao, H. Huang, Z. Xiong, J. Kang, Z. Zheng, Q. Yang, and Z. Zheng, 2022). AI and blockchain technologies directly support the Sustainable Development Goals by enhancing safety and transparency in finance. (A. S. Anwar, A. G. Prawiyogi, et al., 2023.) Decent work and economic growth (Goal 8) is based on the above combination that favours stability and economic growth which provide opportunities for decent work, specifically in developing countries (P. Nath, M. Brahma, P. K. Singh, U. Roy, J. R. Mushahary, 2023.) The combination also provides an important chance for further study and application in the future, especially in fields such as supply chain management and financial services in need of high-security standards. (V. Sharma, K. K. Sharma, B. Kumar, S. Chaudhary, R. Panwar, and T. K. Vashishth).

Literature review has revealed unique features of blockchain and artificial intelligence, as well as their synergistic potential, which provides significant opportunities for improving financial transaction systems. For example, it is noted that AI algorithms for blockchain systems work faster, more accurately and more efficiently than traditional fraud detection algorithms.

AI IN FINANCIAL TRANSACTIONS

Artificial Intelligence is transforming the financial sector. It is particularly applicable in risk management trend forecasting and the detection of fraudulent transactions. AI systems analyse extensive financial datasets with advanced algorithms to detect patterns and anomalies that may indicate fraudulent activity. (Anderson, J. G., Davies, C., Davis, T., & Williams, J. Melinda, 2024.)

AI is used to increase the security of financial institutions. It also enhances the security of nonbanking institutions, among them banks and AI can quickly identify patterns and anomalies through its advanced algorithms and analytical capabilities. This allows them to address and mitigate threats before their escalation. (Didenko (2020); Chalouat, Carrión-Crespo, and Licata (2019). Identity steal and account takeover are significant concerns in the digital landscape, involving both financial institutions and individuals. (Adekanmbi & Wolf, 2024; Saluja, 2024). Artificial intelligence systems excel at verifying identities and assuring individuals are who they claim to be.

This assists enterprises in blocking unauthorized access attempts and checking the legitimacy of their clientele. AI identity verification systems evaluate various identification forms, including government-issued IDs passports and fingerprints by using biometrics language processing and machine learning. By identifying the authenticity of ID papers these AI systems prevent impersonation by automatically identifying the authenticity of the documents. (Pomerleau and Lowery (2020); Onoyere and Adekanmbi (2012); Jakubiec (2020).AI in financial operations cannot be integrated to managing risk. (L. D. Sakti & M. R. Anwar, 2024.) AI models can predict possible risks through examining past data equipping banks with valuable insights to enhance decision-making. (Vegesna, V. (2023). Artificial Intelligence (AI) is emerging as a significant catalyst for improving financial operations thereby improving operational efficiency and customer satisfaction. (S. Wang, X. Cao, Z. Ma, T. Li, G. Min, and G. Zhang (2023).

BLOCKCHAIN IN FINANCIAL TRANSACTIONS

Blockchain technology has profoundly transformed our understanding of financial services security. In 2024, Martinez et al. states that the unique attributes of blockchain—namely its decentralized structure immutability and implementation of smart contracts—offer a robust foundation for the protection of transaction data and financial transactions. (Martinez et al., 2024). Blockchain's immutable record ensure transaction integrity and transparency. In 2024, Martinez et al Dubbed “the chain of blocks” or Blockchains, the blockchain is linked by cryptographic links to the previous activity of each transaction that once approved and included in the blockchain are immutable and resistant to alteration. (Politou et al., 2019; Adeleke et al., 2019; Schär, 2021; Khan et al., 2021). Blockchain technology is optimal for industries necessitating security and trust as it guarantees data integrity against alteration. (H. R. Ngemba, S. Hendra, F. S. Putri, and W, 2024). In summary blockchain is important in developing security solutions for financial services. The framework provides a robust framework for creating a secure infrastructure to transfer financial transactions at any time without ever deleting the information or data on the data. As financial institutions further adopt blockchain technology he predicts enhanced security, reduced risk and higher trust in the financial system. (Olubusola Odeyemi and colleagues, 2024).

INTEGRATION OF AI WITH BLOCKCHAIN FOR TRANSPARENCY AND SECURITY ENHANCEMENT

Blockchain technology and artificial intelligence (AI) work together to create a potent synergy that improves security in the financial services sector. Organizations may devise innovative ways to successfully deal with various security concerns by integrating the analytical prowess of AI with the transparent and secure blockchain platform. (Girija et al., 2023; Kumar et al., 2023; Tyagi, Aswathy & Abraham, 2020). Blockchain transactional networks and AI-driven fraud detection empower businesses to establish a more robust and secure financial ecosystem that protects against theft, manipulation and illicit activities. Identity verification is a vital component of financial transaction security, particularly in the digital era when account takeover and identity theft are frequent risks. (Saluja, 2024; Soomro, et al., 2019; Zukarnain, 2021). Blockchain, automation and Artificial Intelligence (AI) can simplify multi-party business operations by reducing the need for human interaction increasing throughput and promoting superior data integrity. AI models integrated into smart contracts on a blockchain can be used for recalling expired items when they expire or when they reorder, processing payments or purchasing stock based on established criteria and events. A typical deployment would require AI and Blockchains have created transparency, enhanced trust and increased transaction speed. Consider the loan application procedure. Candidates consent to grant blockchain access to their data. The amalgamation of automated application evaluation techniques with data trust can result in accelerated closings and improved customer satisfaction. (Taherdoost, 2022).

BENEFITS

The integration of blockchain technology and artificial intelligence (AI) possesses significant potential to enhance security standards within the financial services sector. Business executives may design innovative solutions which effectively address various security challenges with the benefits of blockchain and artificial intelligence. This report addresses the benefits and implications of integrating blockchain technology with artificial intelligence (AI) to enhance the security of financial services. (Ravi, 2021; Singh et al., 2020; Tyagi, Aswathy & Abraham, 2020). In the financial industry, the

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intersection of AI with blockchain provides opportunities for risk management and regulatory requirements. (Javaid et al., 2022; Xuan, T. R., & Ness, S.) Artificial intelligence (AI) and blockchain technology are reshaping the security of financial services.

CHALLENGES

- Security and privacy: The open and transparent character of blockchain technology can cause sensitive information to be revealed. This challenge is highlighted by researchers like Syed, F.; Gupta, S.K.; Hamood Alsamhi, S.; Rashid, M.; Liu, X. (2021) and Taherdoost (2022).
- Model Inversion Attacks: Corradini, E.; Nicolazzo, S.; Nocera, A.; Ursino, D.; Virgili, L. have illustrated that the parameters of models can be compromised by these attacks, even when Private AI encrypts data.
- Scalability: Worley, C. and Skjellum (2018) assert that transaction performance problems impede the scalability of blockchain systems.

POTENTIAL REMEDIES

Khowaja et al. proposed a two-level security system for model parameters and data in the FLEP AI System.

Trust-based Protection: For improved IoT security, Corradini et al. propose a double-layer blockchain approach.

Integration of Blockchain with Federated Learning: This is a secure and private environment for data exchange.

Advanced AI Algorithms: To boost AI-based solutions for the security of financial services, deep learning and reinforcement learning can be utilized (Olubusola Odeyemi et al., 2024).

Regulation and Collaboration: Stakeholders should cooperate and develop friendly regulatory environments to facilitate the massive adoption of AI-Blockchain solutions (Olubusola Odeyemi et al., 2024).

CONCLUSION

The combination of blockchain and artificial intelligence presents a revolutionary chance to enhance security in the financial sector. As there are current limitations, additional research and development can fully realize the potential of this union, resulting in safer, more transparent, and more secure financial transactions.

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International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
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