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Development of a Blockchain-Integrated Medical Device for Enhanced Data Integrity
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Abstract
Integrating blockchain technology with medical devices is crucial for addressing healthcare data integrity and security challenges. Traditional data storage methods are vulnerable to tampering and unauthorized access, compromising patient safety and privacy. This study develops a blockchain-integrated medical device system to create a tamper-resistant framework. The primary objectives are to secure medical device measurements using blockchain, evaluate the system's security against data tampering and unauthorized access, and assess its performance. The methodology includes deploying smart contracts on the Ethereum blockchain to store hashed and encrypted medical data, simulating data generation with a Raspberry Pi, and implementing user authentication through Flask and JSON Web Tokens (JWT). The system achieved an average transaction throughput of 7.72 TPS and a latency of approximately 0.13 seconds, demonstrating robust tamper resistance. These findings indicate that blockchain integration can significantly enhance data integrity and security in healthcare, improving patient outcomes and data privacy within medical ecosystems. © 2024 IEEE.

Author Keywords
Blockchain technology; data security; healthcare systems; medical data integrity; smart contracts

Index Keywords
Block-chain, Blockchain technology, Data integrity, Data storage, Healthcare systems, Medical data, Medical data integrity, Medical Devices, Security challenges, Unauthorized access; Blockchain

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