

U-MEDCHAIN

A Blockchain Based System for Medical Records Access and Permissions Management

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Abstract: In recent years, the interest in using wireless communication technologies and mobile devices in the healthcare environment has increased. However, despite increased attention to the security of electronic health records, patient privacy is still at risk for data breaches. Thus, it is quite a challenge to involve an access control system especially if the patient's medical data are accessible by users who have diverse privileges in different situations. Blockchain is a new technology that can be adopted for decentralized access control management issues. In this work, blockchain based frame work Electronic Medical Records (EMR) is applied. The proposed frame work aims at providing interoperable, secure, and efficient access to EMRs by health providers, patients and third parties while maintaining the patient's privacy. We propose a timed-based smart contracts whose design meet the demands of EMRs. These contracts are employed in the blockchain for governing the transactions, monitoring the computations performed on the EMRs through the enforcement of the acceptable usage policies and managing the use of data after transmission. This work employs the blockchain technology with a collection of encryption techniques and hash functions. Sensitive information that are placed on the blockchain are encrypted to decrease the possibility of being accessed by unauthorized entity. Advanced cryptographic techniques are also adopted by the proposed framework for providing further security. The use of proxy re-encryption technique is employed to solve the problem of transferring encrypted messages among nodes with no need to share symmetric key. This adopts the distributed ElGamal re-encryption schema with distributed blinding technique. Our proposed framework employs the hashing method SHA-256, to ensure data integrity. The proposed system employs a new incentive mechanism integrated with the Proof of Authority (PoA) consensus algorithm for crating, validation, and appending new block. Now security and access control are maintained by the adoption of advanced encryption and authentication techniques throughout the blockchain. Interoperability, auditability, and accessibility are provided by the use of comprehensive logs. Our proposal gives efficient security and accessibility for medical records in an effective manner.

Keywords: Blockchain, electronic medical records, smart contracts

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