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CRYPTOGRAPHIC-BASED DISTRIBUTED LEDGER FOR SECURE MEDICAL SYSTEMS

Healthcare information is not only private, but also proprietary and requires higher security and adherence to medical standards and policies by health facilities and providers. A secure system for sharing patients' medical records across health facilities and practitioners is required. Cultural, organizational, regulatory and technological challenges have affected confidentiality, integrity, availability and trust of the medical records. For timely and secure access to patients' data, medical systems should be interoperable, private, transparent, immutable and interconnected. Healthcare sector has applied various approaches and platforms like medical data encryption, distributed ledger, blockchain technologies, authentication mechanisms and access control measures. Blockchain technologies have proved to be suitable through their distributed ledger interconnectivity, transparency, immutability, interoperability and anonymity in medical systems. However, blockchain technology is faced with challenges ranging from computational complexity, practicability, privacy poisoning, cyberattacks due to advanced quantum computing technologies. This necessitates for a solution that is simple, practical, trusted, hack proof, immune to quantum computing and cyberattacks, for guaranteed privacy and confidentiality of medical systems. This study seeks to develop a cryptographic-based distributed ledger to guarantee practicability and security of medical systems. Analyze the state of art of distributed ledger schemes used for medical systems using exploratory research design, develop an algorithm for the cryptographic-based distributed ledger system by prototyping, implement a cryptographic-based distributed ledger system for secure medical systems using agile methodology and undertake a comparative analysis of the cryptographic-based distributed ledger system with selected health blockchain systems. Cryptographic-based distributed ledger will lead to secure, verifiable, private, trusted, interoperable, immutable and interconnected medical systems to ensure timely access, sharing and distribution of medical records across health facilities and health practitioners.

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