



**IJIRCCCE**

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

**Volume 9, Issue 7, July 2021**

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

**Impact Factor: 7.542**



9940 572 462



6381 907 438



ijircce@gmail.com



www.ijircce.com

# Applications of Blockchain Technology in Healthcare Field

Annie Jose

Lecturer, Department of Biomedical Engineering, Govt. Polytechnic College, Vechoochira, Kerala, India

**ABSTRACT:** Blockchain technology was evolved as a crypto-currency (Bitcoin) exchange platform in which electronic coins were the exchanged between the nodes in a distributed network without a centralized trusted third party. Later the release of the technology as an open-source code improved its scope as a general-purpose distributed database or ledger platform. The growing interest and benefits of these technologies made it popular in medical record-keeping, data sharing, and exchanging and for data validation among stakeholders. This paper outlines the features of blockchain technologies, their benefits over traditional database management systems, and challenges faced by the technology in the health care field.

**KEYWORDS:** Blockchain technology; data management; healthcare

## I. INTRODUCTION

Blockchain was developed to manage bitcoin exchange and the technology incorporated a new form of the distributed metadata management system. Initially, the amount of storage for transaction data was limited but now several new blockchain implementations have adjustable data sizes. The Healthcare field is a huge data storing and disseminating domain in which data management is crucial due to the security and privacy needed. The second-generation blockchain (2.0) technology is the distributed ledger technology with “smart properties” and “smart contracts”. Smart properties refer to the ownership control by blockchain-based platforms and smart contracts refer to the rules and codes that are designed to control the smart properties. Further development on these technologies leads to the non-financial applications of blockchain technology i.e; the third generation blockchain(3.0). Consequently, blockchain has become a general-purpose technology that applies to other fields like healthcare, supply management, identity management, scientific research, etc. These applications can either work as an authorized network with limited access or an unauthorized network with open access.

The paper focuses on blockchain technology and its key features that benefit the healthcare field in section II. The main applications of blockchain technology in the medical field and potential challenges are discussed in section III and section IV concludes the review with possible solutions and the future of the technology.

used to send the packets from source to destination by selecting the large number of hops criteria. Second metric focuses on the residual batter energy level of entire network or individual battery energy of a node [1].

## II. KEY FEATURES OF BLOCKCHAINS

Blockchain technology adopts the concept of decentralized data management between multiple parties without any centralized third-party authorization as in distributed systems. This mainly overcomes the disadvantage of single-point failures. Also, add other benefits like increased data transfer speed and reduced transaction charges. The technology differs from another database in the basic data storage concept. In blockchains, data is stored in blocks and once the block is full it is chained to the existing blocks. Any blockchain is formed with three elements: blocks, nodes, and miners. The blocks in turn are constituted of data, nonce, and hash. The blocks are formed with data and each time when a block is created then a unique 32-bit number is assigned to it and that is nonce. Then it generates a 256 – bit cryptographic block header hash. Miners are nodes that can add new blocks through mining that is data validation and it is done through complex software to find the right nonce-hash pairs to add the block to the chain. As blockchain is a distributed ledger technology they are connected via nodes and each node has a copy of the blockchain. The cryptographic hashing functions create a digital fingerprint that is used for linking the blocks. Each block will have the hash of the previous block and any changes in the transactions will change the hash function and nodes can easily detect the changes in the network. The chaining is time-stamped with all details [2]. It is an immutable, distributed, and decentralized database arranged in chronological order which is well suited for clinical record keeping applications.

The key features of the technology that makes it suitable for clinical applications can be outlined as below;

- Decentralized data management: the stakeholders of the healthcare field are distributed in nature so they can access data without the ceding of a mediator.
- Immutability: Healthcare needs safe and secure data sharing so the immutability of the data in blockchain ensures unchangeable ledger records.
- Data ownership: In Blockchain the ownership cannot be changed and Medical records can be owned by the patients to make it available as they need it and this avoids data misuse by the stakeholders.
- Transparent and verifiable: As it is a decentralized network data is not stored in a single owner concept. The data in the network is available to all the nodes and its legitimacy can be verified.
- Security and privacy: The data are encrypted and are secured with private cryptographic keys by the owner to protect the data and ensure privacy.

### III. APPLICATIONS AND CHALLENGES OF BLOCKCHAINS IN HEALTHCARE FIELD

Even though blockchains were implemented to benefit in the field of crypto-currencies the advancement of its technology made them suitable for the management of distributed data. In healthcare besides electronic medical record-keeping, the technology is utilized for many other applications like personalized health care, pharmaceutical distribution chain, biomedical research and studies, health insurance claim management, clinical data analysis, genomics medicine, etc. Recently, the disease control strategies for COVID -19 are also utilizing blockchain technology. The technology can globally track the details of the pandemic [3]. The data coverage areas in this scenario include tracking the spread, tracking of drug trials, medical supply tracking, virus variants tracking, etc. The Fig. 1 shows the applications, benefits and challenges of blockchain technology in healthcare field [4].

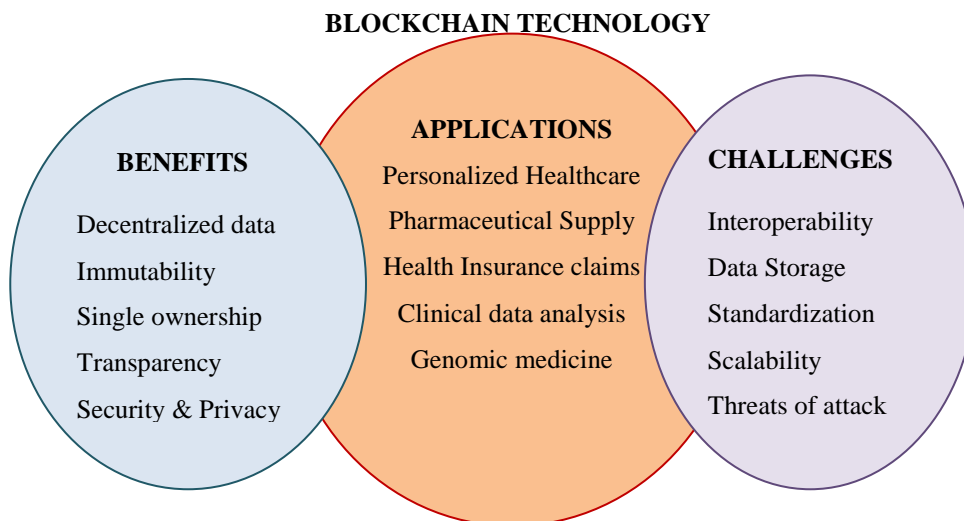


Fig.1 Applications, benefits and challenges of blockchain technology in healthcare field

Blockchain technology is fast growing with vast opportunities however; the potential challenges addressed by it are also increasing. The major challenges include interoperability, storage management, standardization issues, and other technical challenges of scalability and threats of attack. Currently, many solutions are being proposed by researchers to circumvent these limitations. Some proposals are;

- (i) 'offline data storage' in an encrypted form to overcome scalability issues,
- (ii) 'private or consortium' chain instead of public chains to improve security and privacy,
- (iii) 'open standards' can increase interoperability of the blockchain.

### IV. CONCLUSION

Blockchain technology is a decentralized ledger management system that is well suited for the healthcare field when compared to the distributed data management. The benefits of the system provide improved solutions in many medical applications. Moreover, the major concerns about medical records like originality, authenticity, and transparency of

medical history can be ruled out and all stakeholders benefit equally from the records. The combination of blockchain with emerging artificial intelligence technology can advance the healthcare domain into a new era.

#### REFERENCES

1. Sharma, A., Bahl, S., Bagha, A. K., Javaid, M., Shukla, D. K., & Haleem, A. (2020). Blockchain technology and its applications to combat COVID-19 pandemic. *Research on Biomedical Engineering*, 1-8.
2. Kuo, T. T., Kim, H. E., & Ohno-Machado, L. (2017). Blockchain distributed ledger technologies for biomedical and health care applications. *Journal of the American Medical Informatics Association*, 24(6), 1211-1220..
3. Agbo, C. C., Mahmoud, Q. H., & Eklund, J. M. (2019, June). Blockchain technology in healthcare: a systematic review. In *Healthcare* (Vol. 7, No. 2, p. 56). Multidisciplinary Digital Publishing Institute.
4. Siyal, A. A., Junejo, A. Z., Zawish, M., Ahmed, K., Khalil, A., & Soursou, G. (2019). Applications of blockchain technology in medicine and healthcare: Challenges and future perspectives. *Cryptography*, 3(1), 3.

#### BIOGRAPHY

**Mrs Annie Jose** is currently working as Lecture in Biomedical Engineering at Govt. Polytechnic College, Vechoochira, Kerala, India. She received her M.E Degree in Applied Electronics from Anna University Chennai, India in the year 2008. She received her B.Tech Degree in Biomedical Engineering from Cochin University of Science and technology, Kerala, India in the year 2002. She is having 15 years of teaching experience. Her research interest includes WBAN, wireless networks and Embedded systems.



**INNO**  **SPACE**  
SJIF Scientific Journal Impact Factor  
**Impact Factor: 7.542**



**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
**INDIA**



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

 **9940 572 462**  **6381 907 438**  **ijircce@gmail.com**



[www.ijircce.com](http://www.ijircce.com)

Scan to save the contact details