

# Blockchain and IoT Technology in Healthcare: A Review

B SIVASANKARI<sup>a,1</sup> and P VARALAKSHMI<sup>a</sup>

<sup>a</sup>Department of Computer Technology, Anna University, MIT Campus, Chennai, India

**Abstract.** The tremendous shift in technology has led to many unconnected things getting interconnected via IoT. IoT is one of the major modes of collecting data from various networked resources and other connected devices. The broad range of IoT, with its huge heterogeneity in handling data, addresses many challenges in the realm of healthcare. Blockchain technology has elevated the use of distributed storage in a positive way. The recent emergence of this technology has paved way for potentially enormous utilization in various fields. Blockchain technology in the fields of IT, finance, industries, government, healthcare, media, and law enforcement has altered the service quality levels to an ethical ideal. Blockchain, in conjunction with IoT, facilitates decentralized collection and storage of data. Integrating blockchain with IoT has emerged as a cutting-edge tool for the decentralized sharing of medical records, monitoring of patients, ensuring the privacy of patient records, predicting the quantum of insurance, and managing supply chains.

**Keywords.** Blockchain, Internet of Things, Hyperledger Fabric, B-IoT (Blockchain-based IoT)

## 1. Introduction

IoT enables a network of physical entities by embedding sensors, operating software, and other technologies. IoT plays an important role in various fields due to its capability to provide sensor-based information and its ability to enable device-to-device communication. The advancement of sensing technologies has led to tremendous growth in data collection and data analysis.

Blockchain can be defined as a decentralized storage system that facilitates cryptographically secure storing and sharing of records immutably through a network comprising of distributed peer-to-peer members. The white paper laid the foundation for bringing solutions to globally connected technology, comprising of decentralized monetary mechanisms [1]. In this paper, they describe how Bitcoin evolved and took technology deployment in a decentralized network to the next level.

---

<sup>1</sup> B Sivasankari, Corresponding author, Department of Computer Technology, MIT Campus, Anna University, Chennai – 600044, India; E-mail: sivashankaripitam@gmail.com

## 2. IoT and Blockchain in Healthcare

IoT layer is made of sensors, motors, controllers, gateways, and other similar computational resources. This layer also facilitates the storage and management of these resources. It uses wireless standards such as ZigBee, Wi-Fi, or LoRa [2]. The edge layer serves the purpose of coordination of different technical assets and it is close to the end-users.

The application layer consists of elements related to cloud management, data analysis, authorization, and knowledge base. It has a collection of services and business applications. Patient's Electronic Health records, present and past complaints, day-to-day routines, medication details, and genomic data can be measured using IoT sensors [2]. The Blockchain rectifies the drawbacks of the centralized storage system and cooperates with edge computations to securely store information on the network. A Hyperledger platform is a permissioned distributed ledger for deploying applications with access control specifications [3].

## 3. Applications of Blockchain-based IoT (B-IoT) in Health Care

A consortium blockchain-based medical information sharing system uses k-anonymity, and keyword searchable encryption to ensure data privacy and security. It scrutinizes every single payment and lowers the load on insurance auditors. The layered architecture of B-IoT comprises a physical layer, blockchain layer, and application layer. The physical layer consists of sensor nodes as end devices of the IoT network. Data aggregated from the IoT network are stored in the blockchain layer securely in a decentralized manner. Applications are executed in the application layer by retrieving the data from the blockchain layer.

## 4. Conclusion

This survey examines the various aspects of the literature pertaining to bundling IoT with blockchain in the healthcare domain. The decentralized storage system used in blockchain with IoT guarantees privacy and security in sharing critical data. Important Sensors in IoT networks and their usage in the health sector have been described. The future of Blockchain rests on integrating machine learning and the Internet of Things with Blockchain technology to develop an autonomous network with distributed storage.

## References

- [1] Nakamoto S. Bitcoin: A Peer-to-Peer Electronic Cash System, 2008, Available: <http://bitcoin.org/bitcoin.pdf>.
- [2] ElRahman SA, Alluhaidan AS. Blockchain technology and IoT-edge framework for sharing healthcare services, Springer, Soft Computing, 2021, Nov; 25:13753–13777.
- [3] Xu X, Wang X, Li Z, et al. Mitigating Conflicting Transactions in Hyperledger Fabric-Permissioned Blockchain for Delay-Sensitive IoT Applications, IEEE Trans. IEEE Internet of Things Journal, 2021, Jul; vol. 8, no. 13, pp. 10596 – 10607.