

# Implementing Blockchain Technology in the IoT

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**Abstract:** *The Internet of Things is a type of technology in which devices are connected to a network. Since all devices are connected to a single network, the is at risk of a cyberattack if the network is not protected. By deploying blockchain technology in any IoT system, you can secure your system and reduce its vulnerability to cyberattacks. While using an IoT platform based on blockchain technology 6 has valuable advantages, it is worth considering various alternatives between blockchain technologies. They all have their own limitations and are not suitable for all usage scenarios. This review lists some of the shortcomings of blockchain technology in this regard. In the course of this investigation of this review paper, we encountered various shortcomings of IoT that can be overcome by adopting different types of blockchain technology in -specific IoT systems. When adopting blockchain technology for a particular IoT system, you need to be able to perform systematic analysis to suit your needs and obtain the blockchain capabilities that are appropriate for that particular scenario.*

**Keywords:** Block Chain, Security, IoT system

## I. INTRODUCTION

The world is full of information. This information can be uprooted by connecting various objects such as sensors, actuators, and transmitters to send and receive data over the Internet. This allows you to interact without manual intervention. Concept for defining this network of devices that connect the real and virtual worlds is the Internet of Things (IoT).

By installing sensors and actuators and combining them with IoT systems, you will be able to maximize the potential of the and detect the actual phenomenon. With that help, you can get the information generated by these objects. These objects also have the ability to evolve themselves to take preemptive actions for specific scenarios, taking into account previously generated 4464 data.

With the increased responsiveness provided by the IoT, this concept is very popular with the resource optimization issues that are in high demand in today's industry for cost savings (smart grids, smart homes, smart farming, smart cities). There are [1], [2]. [3], [4]. In addition, this type of platform can be used to automate services that enhance the user experience and provide users with more information to improve decisions (smart supply chain, connected health, wearables). [5], [6], [7].

While these opportunities make the use of IoT platforms very attractive, they also face many challenges. As organizations have more access to information about our daily lives, privacy becomes more of a concern, and device security is constantly being exchanged between devices over the Internet. Vulnerable to attacks that compromise data integrity [8].

Researchers have proposed using blockchain technology to protect the privacy and integrity of the data generated by. Blockchain is a non-corrupting distributed digital ledger that can be programmed to store virtually anything. The technology behind this ledger is based on a peer-to-peer (P2P) network.

From a node that stores information redundantly. These nodes use a consensus algorithm to ensure that the information generated on the platform is saved by the actor claiming it and, once saved, does not change over time [8].

In IoT systems, BT can be used as an alternative to traditional databases managed by central authorities such as banks, auditors, and governments. The open and decentralized nature of blockchain allows you to list its key benefits.

- Ensure data integrity using a consensus algorithm that keeps the data stored on the blockchain consistent across the nodes of your network. This log gives the ledger an immutable nature, so what was written to the log cannot be tampered with or edited later.

- Data signed by the public key mechanism. This feature makes it easy to see the source of all the data stored on the blockchain.
- It increases the cost of using the system and at the same time eliminates intermediaries who are prone to human error in operating the system. This function is due to the possibility of storing immutable code in the blockchain.

## **II. CHALLENGES OF BT**

The purpose of this section is to show the BT limiting factors for improving IoT systems. In addition, we will discuss some basic concept that will help you better understand the art of blockchain protocols.

First, the data sent to the blocking chain is called a transaction (Tx). This data is signed by the owner and validated by the network node you want to write to the blockchain. After validation, Tx is grouped with other Tx and blocks are created from it.

Blocks are a fundamental part of the blockchain and are formed by connecting new blocks with the last saved block. The process of adding new blocks to the blockchain is called mining and was first used in Bitcoin's Proof of Work (PoW) consensus algorithm.

It solves crypto problems by spending a lot of energy to be rewarded with Bitcoin.

You need to check the Tx stored in the block of the blockchain. The verification process simply stores the Tx and then adds a new block of data to the blockchain.

The number of blocks written depends on the blockchain technology used. For example, the Bitcoin blockchain [8] requires at least 6 blocks to fully verify the stored data. The following concepts help explain the main challenges of blockchain technology

- **Storage capacity and scalability:** With blockchain technology, the size of the data stored on the blockchain is constantly increasing. As time goes by and more transactions are executed, the node needs more resources to store them. Example: A node that owns a complete chain of full blocks and is responsible for the validation, routing, and mining processes. Lightnodes store only a portion of the history of transactions performed on the platform. The sole purpose of a write node is to make the data available to users who request it.
- **Security:** The blockchain can verify that the data stored on the blockchain is from the expected IoT device. Problems arise when these sources send data that is corrupted due to vandalism, short circuits, disconnections, weather, etc. Corrupted data sources are not always malicious, but if corrupted data is stored on the blockchain, it will be stored permanently in that state.
- **Anonymity and Privacy:** To protect sensitive and private data from users of the IoT platform, it can be encrypted using BT's public key mechanism [8]. This mechanism can be used from outside the device when invoking a service provided by the blockchain network, or it can be provided to the device by implementing a security protocol.
- **Smart contracts:** One of the problems with this type of program is that the code is distributed only for validation, not sharing tasks to gain computing power. This is a limitation that has led to the implementation and execution of simple and inexpensive smart contracts in terms of computational costs.
- **Legal Issues:** Spanish law states in Article 1290 of the Civil Code that "a valid contract may be terminated if determined by law." The same is true for the rest of the articles about the termination of the contract. That is, every contract must provide a way to cancel it. Due to the immutability of smart contracts deployed in blockchain networks, it is impossible to terminate them.

## **III. CONCLUDING DISCUSSION**

More and more information is being shared over the Internet, thanks to IoT devices monitoring their surroundings. The information transmitted may be sensitive, and such platforms need a way to prevent unauthorized persons from reading the data or by an attacker from tampering with the data.

BT can enrich its IoT platform by providing reliable, traceable and shared services of information. Data sources are easily identifiable, and once the data is stored, it remains immutable over time, increasing the security of the platforms

that depend on that data. Also, thanks to the smart contract system provided by the blockchain, the devices in the network can no longer rely on the central authority. The integration of these two technologies supports a platform consisting of autonomous agents that mutually negotiate the progress of the entire system. Everything to achieve durability, operational efficiency, efficiency, and financial economy, without the need for central control and / or human intervention, and without intermediaries.

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