Counterfeit drugs prevention using block chain techniques

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Abstract—The production and distribution of counterfeit drugs is an urgent and increasingly critical worldwide issue, especially in developing countries. The pharmaceutical counterfeiting’s market price has hit over billions of dollars yearly. The flawed supply chain system in the pharmaceutical industry is one of the main reasons for drug imitations. Before meeting the clients, the ownership of the medicaments shifts from suppliers to wholesalers. Knowledge is not shared between processes in modern supply chain systems; manufacturers don't even have any input at what occurs to their goods, just that the drug administration has no summary of the system; reminder programs are complex and inefficient and patients can not follow up. This project describes how in the pharmaceutical supply chains we use block chain technologies to provide the monitoring and protection of the drug supplier. The presented method will also be used by the pharmaceutical industry to track the medication from the particular time it is manufactured to the patient. The result of each drug used is recorded for future use in the database. An accepted block chain is used for storing transactions and only trusted parties can enter the network and move data in the block chain.

Keywords: pharmaceutical, drug imitations, medication, patient

1. Introduction

The key justification for this project is to ensure tighter quality controls for the drugs we use. In the present situation, nearly half the goods we eat are adulterated in one way or another. From the packaging to the marking of the materials, to the printing of the date of manufacture, to the expiry date, some sort of malpractice is taking place right under our nose.

This is because block chain is open and data entered cannot be modified [1]. The explanation for the choice of a block chain as a solution to adulterations and other medicine-related problems. If the entire mechanism and the entity involved with drugs are present on the block chain network, so it is almost impossible for anyone to view an inaccurate and altered meaning, since any transaction is visible and it is easier to detect every error[2]. To explain how to use block chain for the pharmaceutical industry. This initiative seeks to inform the consumer about the medicine's expiry date. The block chain drug delivery system looks forward to a safer, open delivery of medication.

Its goal is to describe and demonstrate clearly how the drug is made, the processes and the ways in which it is distributed and in which mode. Manufacturing specifics and date are correctly identified. The use of block chain technology[3] would prevent changes and manipulation in the records. Both blocks are connected to each other with the cryptographic hash function. Data within the block are also hacked and preserved as a merkle tree. Therefore, if someone is attempting to modify the saved data, the significance of hash changes will change and the relation between breaks will lead to data loss and may be used to modify the data[4]. This is how block chain data qualities vary from standard data. While the global manufacture of and trade in drugs has opened up access to
pharmaceutical goods and expanded customer preferences, the supply chain is growing lengthier and more complicated.

Therefore, if someone is attempting to modify the saved data, the significance of hash changes will change and the relation between breaks will lead to data loss and may be used to modify the data[4]. This is how block chain data qualities vary from standard data. While the global manufacture of and trade in drugs has opened up access to pharmaceutical goods and expanded customer preferences, the supply chain is growing lengthier and more complicated. The ride from farm to fork is less transparent. Increasing lack of clarity growing make it hard to quickly diagnose and fix problems like beginning reminders when necessary[5][6][7] also though producers, wholesalers, and distributors are completely committed to the implementation of rigorous measures for pharmaceutical protection.

2. Block chain

Block chain can be a shared network for computing and information exchange, which permits knowledgeable domains that do not trust each other to communicate, organise and interact during the logical decision-making process. A growing number of documents known as cryptography blocks may be a block chain[8]. Per block has its own cryptography. Each block has the last block's cryptographic hash. Transaction data and timestamps are usually seen as a root hash of merkle tree. The block chain has been developed to discourage transition. Block chains are operated internally by a peer-to-peer network, which adheres to inter-noden exchange protocols and validates new blocks [9], for use as a distributed registry. Until registered, the information cannot be changed retroactively in any single block without having rotating all the following blocks, which would entail the approval of the majority of the network.

Block chain documents are not entirely unchangeable but they are perceived as stable and have high Byzantine fault tolerance in the distributed database system [10]. Therefore, the use of the block chain gained a decentralised approval. The following articles address these elements of block chain. A block includes the previous block cryptographic hatch, a history, and transaction data commonly described as a root haze for the merkle tree. Based on the use, Block chain is divided into private, public and hybrid varieties. Block chain technologies can potentially be used in sectors such as financial and health services. In diverse sectors where funds are handled and transfers take place, Block chain may be used. With functional features that allow transactions by trust, consent, protection and intelligent contracts, it can provide a stable safeguard chain for both the digital and physical properties.

![Figure 1. Traditional vs Blockchain Transacional Model](image_url)
These topics are explored in the following section. An exchange is a substitution of funds under such business rules. These rules are typically implemented by scripting and used for sophisticated transactions such as escrow and multi-party signatures. This is also the principle for intelligent contracts. Both parties have consensus on the blockchain because they all have the same versions of the blockchain and are responsible for checking it. Both players who make decentralisation of blockchain the key force will possess the same copy of the file [11]. The algorithm will also ensure that each additional block is appropriate, stopping the attackers from disrupting the chain. In order to solve a cryptographic problem by miners, we use evidence of the working proposition. Miners use computational tools and are rewarded by numerous approaches for their efforts. Additional consensus models are proposed in the literature to resolve a set of shortcomings in the first proof of work model, by attempting to reconcile equity with resource expenditures [12], such as evidence of stakes, proof of fire, evidence for the elapsed and proof of ability.

3. Hash Chain

A hash chain may be a list of records in which each record includes both the hash of the previous record and the hash of all of that record material. A hash may be a feature that transforms a letter or number input into an encrypted, fixed length output. A hash is performed using an algorithm and is critical for cryptocurrency blockchain management. The hash functionality is introduced using the linked list management principle. There are two sections of the related list, one data section and one pointer section.

Pointe is used to store the following record address [13]. Information is unchangeable in blockchain and thus unchanged. If there are improvements, the whole blockchain mechanism will be affected. In the blocks, someone in the blockchain network changes the payload. In addition, the hash value of the following block is changed as hash value is changed if one character is changed. In general, the key aspects of decentralisation, liability and encryption are blockchain technologies. This device will substantially increase productivity and save costs [14]. Previous block hash is used to make the hash of the corresponding block significant. A representative hash of all transactions used in a block may be Merkle root [16] [17].

Figure 2. A sequence of records linked together, each record contains the hash of previous record

4. Implementation

For implementation, the following steps are required:

- Web browser (chrome) installation.
• Nodejs build.
• Meta Mask installation.
• Add MetaMask to the Web browser extension.
• Browser access (Open Source Environment) for RemixIDE.

The subsequent steps are
• The browser has to be installed.
  • The device is supported with the "Internet Browser" or "Microsoft Edge" native or pre-installed browsers.
  • Open it to chrome Google so the website has to be opened to chrome search.
  • Select the input form enabled download option. There are 32 bit and 64 bit types. The connexion relation with the user is shown in most situations, since the device automatically detects.
  • Double click, or click Run when the configuration file is downloaded and the installation process then begins.
  • Terms and conditions recognise and consent to continue.

The subsequent steps are
• Do NODEJS build.
  • Open the terminal.
  • Run "node -v" in your terminal to validate that Node.js has been activated-something like V6.9.5 is expected.
  • Use "npm install npm-global" to upgrade the npm build.
  • NPM (npm-v) scan.

The subsequent steps are
• Would the meta mask have to be mounted and the metamask set.
  • Install your browser with MetaMask.
  • When installed, next to your address bar, you can display the MetaMask fox symbol.

To simply accept the Privacy Notice, click on the icon and click Accept.

• See the Terms of Use. Check them out, scroll down to the bottom, then press approve them.
• We would now like to bind MetaMask to the RemixIDE blockchain.
• The Meta Mask displays a "Networks" menu featuring Ropsten’s Core Ethereum Network.
• Network test, Rinkeby Test Kovan Test Network.

5. How it works

The block chain network is used for all nodes. Each node is known as an entity or device. Any node in the block chain network will make a transaction. Open ledger is one of the transaction information services used. Details of the transaction cannot be replicated as distributed [15]. So it is referred to as the distributed machine. The miner is used for mining blocks after which blocks are inserted. Miners reach the level of difficulty in order to add only cylinders.
6. Conclusion
The goal of this project is to include the exact date of the development of the drug. When we know certain information about a drug, we can be positive whether or not the medication is in good health. This specifics are included in standard packaging, but the data cloud can be quickly altered. When using the block chain, storing those information in a block would guarantee that there is no manipulation and that the data remains untouched.

7. Future work
In our job, a user-friendly smartphone interface can be transformed. The programme would allow the users to accurately classify medication information. If any violence exists, it is recordable in the app. We will review specifics through the app before purchasing the drug.

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