Drug Tracing System Using Blockchain Technology

Rapelli Srikanth[1]
Assistant Professor
Department of computer science and Engineering(Data science)
CMR Engineering College
Hyderabad, India
rapellisrikanth90@gmail.com

Aluri Gopi[2]
Assistant Professor
Department of Electronics and Communication Engineering
CMR Engineering College
Hyderabad, India
alurigopi@cmrec.ac.in

Yashwanth[3]
B.tech Student
Department of computer science and Engineering(Data science)
CMR Engineering College
Hyderabad, India

P.Keerthana[4]
B.tech Student
Department of computer science and Engineering(Data science)
CMR Engineering College
Hyderabad, India

Abstract— Healthcare supply chains are complicated networks that span various departmental and geographical limits and provide the foundation for many benefits that are necessary for everyday life .The difficulties of this systems can result in contaminations such as erroneous data and lack of clarity and poor data origin. one issue of present supply chain restrictions is the production of counterfeit drugs, which not only has negative impact on people health but also has negative impact on financial status of pharmaceutical business. A recent research emphasised the importance of a well founded end-to-end track and trace system for health care supply chains .The smart contract ensures data provenance and gives all participants access to a secure unalterable transaction history .Moreover, it eliminates the need for intermediaries we give a high-level overview of the system architecture and algorithms that form the basis of the key elements of our proposed solution. we test and analyse the system to find how effectively it can enhance traceability inside health care supply chains before providing a cost and security analysis

Keywords— Drug Counterfeiting , Supply Chain, Blockchain, Traceability, Healthcare, Trust, Securit

INTRODUCTION

The supply chain for healthcare includes a complicated network of many individual businesses, including manufacturers, distributors, pharmacies, hospitals, and patients in addition to raw material suppliers. because of several problems, such as a lack of knowledge, centralized control, and competition between stakeholders. It is difficult to trace items via this network. Counterfeit drugs are those that have been intentionally produced fraudulently or with inaccurate labels on their identity or source to pass for legitimate ones. According to the financing organization for medical research, up to 30 drugs are bogus and distributed in developing countries. Furthermore, recent research by the World Health Organisation discovered that consuming fake pharmaceuticals is one of the main reasons people die in developing countries, with children accounting for the bulk of the deaths. The difficulty of this distribution strategy is mostly used to deliver counterfeit drugs to the customers because of the complicated architecture of the drug supply chain. Although our approach is similar to their effort in that it also employs blockchain and focuses on the health care supply chain, blockchain-based traceability for the pharmaceutical supply chain. We recommend a blockchain-based system for the pharmaceutical supply chain that provides immutability , data provenance, traceability, security, and accessibility for pharmaceutical drugs. To facilitate various transactions between parties participating in the pharmaceutical supply chain, we develop a smart contract. To analyze the effectiveness of the suggested blockchain based solution, we assure security and cost analyses.

LITERATURE SURVEY

For preparing this article, We have referred many papers:

The paper by **Sudeep Tanwar** relates to Automating covid -19 vaccine forward supply chain and the main motive is to present a system which is an integration of blockchain based decentralized system and inter planetary file system for the storage of records.

The paper by '**Haq, Ijazul** relates to Traceability of Pharma supply chain and the main objective is to present a drug supply system which uses block chain technology. This system also includes tracking of the drug. It also have few limitations such as decentralization and transparency of the system.

The paper by **Bryatov, S** explains about Counterfeit Drug. The main objective of this system is to find and check authenticity of the drug through out the supply chain and also this system uses Hyperledger to track the drug. It has few limitations that are Smart contracts, access lists, and prototype have not been created. Moreover no tests have been carried out.

The paper by **Shaker ALHARTHI** explains about Problem in pharmaceutical supply of Saudi Arabia. The objective of this system is to use Blockchain system for the problems in existing pharmaceutical supply chain in Saudi Arabia but the actual implementation has not been discussed.

The paper by **Shruti Srivastava** explains about Tracking drug distribution. The main objective of this system is to provide a tracking solution that has decentralized and distributed tracing system with the traditional RFID and barcodes. The limitation is author didn't provided any practical implementation.

EXISTING SYSTEM

Several drug control systems are currently in use. Here are some examples: Barcodes: Most pharmaceutical labels contain barcodes that can be scanned as they move through the supply chain. This technology has been around for a long time and is widely used. Radio Frequency Identification (RFID): Another drug tracking system is RFID, which transmits wirelessly using small tags. These records can be read at various points in the drug supply chain to monitor the shipment and location of pharmaceutical products. Electronic Product Code Information Service (EPCIS) is a qualitative format for monitoring and exchanging supply chain events such as drug transit. True product tracking is enabled by this technology, which can improve supply chain visibility and efficiency. Serialization: The serialization process involves assigning a unique identification number to each drug. This allows you to track and trace each product as it moves throughout the drug supply chain.

DISADVANTAGES OF EXISTING

System Lack of transparency: Some existing systems, such as barcoding and RFID, may not provide full clarity of the drug supply chain because they only track the physical movement of products without providing a comprehensive record of their entire history.

Vulnerability to data tampering: The use of centralized databases in some existing systems makes them vulnerable to data tampering and hacking, which could compromise the integrity of the tracking data.

Limited data sharing: Existing systems may not allow for the sharing of data beyond the immediate parties involved in the supply chain, which can limit the ability to identify and address issues such as counterfeit drugs or drug diversion.

Lack of standardization: Different systems may use different standards and formats for tracking and sharing data, which can make it difficult to achieve interoperability and streamline workflows.

High costs: Implementing and maintaining existing systems can be expensive, particularly for smaller companies or those with limited resources.

Blockchain-based systems can address many of these disadvantages by providing a transparent and immutable record of drug movements, enhancing data security and privacy, allowing for secure data sharing, and promoting interoperability and standardization. Additionally, the use of smart contracts can automate various tasks and reduce costs in the supply chain.

OBJECTIVE

A blockchain based pharmaceutical supply chain offers data source for pharmaceutical drugs that is secure, able to be tracked down, unchangeable and easily accessible.
To create a smart contract that can manage a range of transactions between parties involved in the pharmaceutical supply chain.
To assess the effectiveness of the suggested blockchain-based solution security and cost analysis must be done.

PROPOSED SYSTEM

In proposed system which only includes suppliers, manufacturers, and wholesalers as stakeholders, the proposed system employs methodologies that identify and include key players in the medication supply chain, including the FDA, provider, drug stores, distributors , producers and customer. This leads to the portrayal of pharmacists as an outsider, which is untrue in a genuine medication supply chain.
Second, we explicitly work to describe the relationships that the system now lacks, such as those between on-chain resources, collaborator , decentralized storage systems and smart contracts. Additionally, because stakeholder interactions are crucial, we provided clear solutions to remove any uncertainty, where as such interactions are not defined in previous systems.
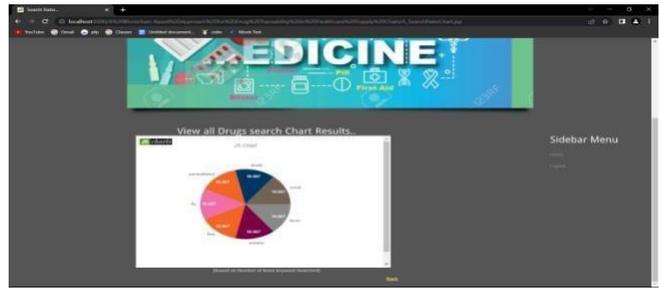
RESULTS

Home page

Patient Login

Patient Registration

Pharmacy Login

This happens due to Incorrect Username/Password

Drug chain

Drug chart

Drugs search chart
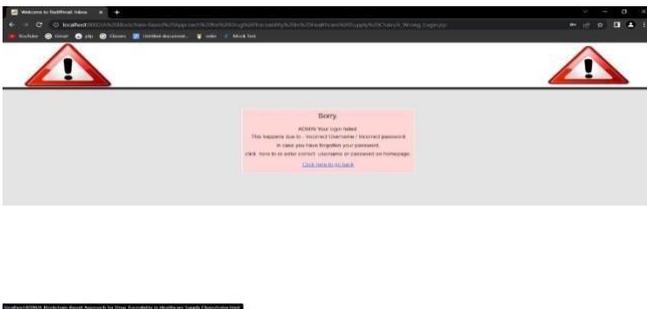

CONCLUSION

We looked at the difficulty of tracking drugs in the pharmaceutical supply chain and highlighted their importance in protecting against counterfeit drugs in particular. Using our proposed method, we have developed and tested a blockchain based health care supply chain system that allows decentralized drug tracing and tracking. In order to carry out automatic capturing of events accessible to all interested parties, smart contracts on the ether blockchain allow logging of events in the supply chain in the amount of gas used to perform various operations that take place within

the scope of smart contracts. We have demonstrated the cost effectiveness of our proposed method, and the results of the security analysis performed have proven that our proposed solution is protected from malicious attempts aimed at data integrity and non-repudiation of key operations. We want to develop the proposed system as part of our efforts to improve the efficiency of the health care supply chain, a complex multiple stakeholder agreement such as the drug supply chain , to achieve complete transparency and auditability of drug use.

FUTURE EXTENSION

To expand their capabilities, blockchain-based drug traceability systems can be extended in a variety of ways. These extensions include integrating IoT devices to collect more detailed data about drugs in the supply chain, using AI to detect issues such as counterfeiting or drug diversion, and sharing additional data beyond drug traceability, such as clinical trial information or adverse event reports. Smart contracts can also help to increase supply chain efficiency by automating certain processes. Interoperability with other healthcare technology, such as EHRs and clinical decision support systems, is critical. Data storage on a decentralised blockchain can improve data security and prevent unauthorised access to critical data.

REFERENCES

1. "Shortage of personal protective equipment endangering health workersworldwide" https://tinyurl.com/v5qauvp. [Accessed on: 3-June-2020]

2. Chambliss W, Carroll W, Yelvigi M, el al. "Role of the pharmacist inpreventing distribution of counterfeit medications". J Am pharm Assoc.2012;52(2): 195-199.

3.Ziance RJ. "Roles for pharmacy in combating counterfeit drugs". J Ampharm Assoc. 2008;48: e71-e88.

3. Toscan P. "The dangerous world of counterfeit prescription drugs".Available: http://usatoday30.usatoday.com/money/industries/health/dru gs/story/2011-10-09/cnbc-drugs/50690880/1.[Accessed on:3-June-2020]

4. T.Adhanom, "Health is a fundamental human right",2017.Available:https://www.who.int/mediacentre/new s/statements/fundamental-human-right/en/. [Accessed: 26- May- 2020].

5. Funding, H.R. "20 Shocking Counterfeit Drugs Statistics". 2017 Available:https://healthresearchfunding.org/20-shocking- counterfeit- drugsstatistics.[Accessed: 3-June-2020].

6. Blackstone, E.A.; Fuhr, J.P., Jr.; Pociask, S. "The healthand economiceffects of counterfeit drugs". Am. Health Drug Benefits 2014, 7, 216–224.