Fake Medicine Detection Using Blockchain

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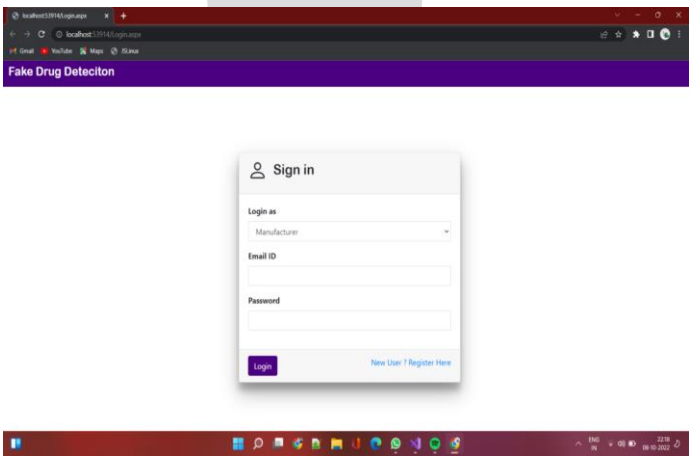
Abstract— Healthcare supply chains are complex structures gauging across multiple organizational and geographical boundaries, furnishing critical backbone to services vital for everyday life. The essential complexity of similar systems can introduce contaminations including inaccurate information, lack of translucency and limited data provenance. Fake medicines are one consequence of similar limitations within being supply chains which not only has serious adverse impact on mortal health but also causes severe profitable loss to the healthcare industry. Accordingly, being studies have emphasized the need for a robust, end- to- end track and trace system for pharmaceutical supply chains. Therein, an end- to- end product shadowing system across the pharmaceutical supply chain is consummate to icing product safety and barring fakes. Fake medicines are an expanding serious issue associated with the healthcare industry which causes extreme consequences to the society. The traceability of the medicines throughout the pharma supply chain is a delicate task. Another serious issue in combating fake drugs in healthcare systems is the conservation and sharing of health records. The security of e health records is of high concern as they're prone to confidentiality and integrity consequences. The negligence of these consequences might have severe consequences to the healthcare systems like death of the case. Therefore, the need arises to design a blockchain based system which helps in fighting with the falsified drugs and icing the security of e-health records. The being supply chain for the pharmaceutical industry is obsolete and lacks clear visibility over the entire system. Also, the rotation of fake medicines in the request has increased over the times. According to the who report, around 10.5% of the medicinal medicines in lower/ middle income countries are fake and similar medicines may pose serious consequences to public health, occasionally leading to death. Keeping these consequences in mind, in this paper, we propose a blockchain- based model to track the movement of medicines from the industry to the case and to minimize the chances of a medicine being fake. The reasons for using blockchain technology in our work include its invariability property and easy shadowing of a reality in the blockchain. Through this proposed model, the manufacturer would be suitable to upload the details corresponding to a medicine, after which it'll be transferred for blessing our perpetration of the proposed blockchain based model highlights that the model can successfully descry any medicine being fake. This will be salutary for the druggies getting affected with fake medicines. Also, with the proposed model, we can also track the movement of the medicine beginning from the manufacturer right up to the case consuming that medicine.

I. INTRODUCTION

In this period, the world of pirating and counterfeiting has touched nearly every product including drugs and medicines. The challenge of fake medicines in the pharmaceutical assiduity has been adding across the globe over the history numerous times. According to a who report, around 10.5% of the pharmaceutical medicines in the market of low or middle- income countries are fake. Hence, there's a need to develop a strong model to overcome the issue of counterfeiting medicines. Also, the current assiduity lacks clear visibility over the delivery of the medicines from the pharmaceutical company to the cases. Keeping these challenges in mind, we aim to develop a blockchain- based model that can help medicine counterfeiting and keep track of medicine movement from the assiduity to the cases. Healthcare supply chain is a complex network of several independent realities that include raw material suppliers, manufacturer, distributor, drug stores, hospitals and cases. Tracking inventories through this network is non-trivial due to several factors including lack of information, centralized control and contending gest among stakeholders. Similar complexity not only results in in- edge similar as those stressed through coved- 19 pandemic but can also aggravate the challenge of mollifying against fake medicines as these can fluently percolate the healthcare supply chain. Fake medicines are products designedly and fraudulently produced and/ or mislabeled with respect to identity and/ or source to make it appear to be a genuine product. Similar medicines can include specifics that contain no active pharmaceutical ingredient(api), an incorrect amount of api, an inferior- quality api, a wrong api, pollutants, or repackaged departed products. Some fake specifics may indeed be inaptly formulated and produced in unacceptable conditions. According to the health research funding organization, over to 30 of the medicines vended in developing countries are fake. Further, a recent study by world health organization(who) indicated fake medicines as one of the major causes of deaths in developing countries, and in utmost cases the victims are children.

In addition to the adverse impact on mortal lives, fake medicines also beget significant profitable loss to the pharmaceutical industry. A typical medicine supply chain distribution process is illustrated in figure 1. An api supplier is responsible for delivering the raw accoutrements to manufacture medicines approved by a nonsupervisory agency such as the us food and drug administration (us fda). The manufacturer packages the medicines into a lot or sends it to a re- packager. The primary distributor receives several lots of the product and is responsible for transferring them to drug stores based on product demand or secondary distributors (in case the volume of lots is veritably large) who can transfer these lots to the pharmacies. Eventually, a drugstore will apportion the medicine to cases generally based on a doctor's prescription. Throughout the supply chain, the transfer of medicines is generally eased by third party logistic service providers similar as Ups or Fedex and in some cases the distributors operate their own line of vehicles to transport the products. The primary reason for fake medicines to reach end- user business is due to the complex structure of a healthcare supply chain. Using the complexity of this distribution process, medications can fluently pass through with little or no trail of information and empirical attestation. Accordingly, monitoring, effective control and shadowing of products in healthcare supply chain is fundamental to combating fakes. The significance of medicine traceability (track and trace) is increasingly emphasized and mandated by several countries across the world. For illustration, these. Drug supply chain security act (DSCSA) has made it obligatory for the pharmaceutical assiduity to develop an electronic and interoperable system that identifies and tracks prescription medicines as they're distributed across the united states. Also, over the last 8 times, china needed all the stakeholders involved in the medicines supply chain to record information of individual pharmaceutical products in a technical its system whenever medicines are transferred to/ from their storages. Thus, medicine traceability has come an integral part of the pharmaceutical supply chain as it establishes authenticity, and aims to track and trace chain of guardianship of the product across medicine supply chain. Blockchain technology has introduced a new model of operation development primarily based on the successful perpetration of the data structure within the bitcoin operation. The abecedarian conception of the blockchain data structure is analogous to a linked list i.e. it's participated among all the nodes of the network where each knot keeps its original copy of all the blocks (associated with the longest chain) starting from its genesis block. Lately, numerous real- world operations have been developed in different disciplines, similar as the internet of things, e-government and e-document operation. These operations influence benefits of blockchain technology due to its self- cryptographic validation structure among transactions (through hashes), and public vacuity of distributed ledger of transaction- records in a peer- to- peer network. Creating a chain of blocks connected by cryptographic constructs(hashes) makes it veritably difficult to tamper the records, as it would bring the rework from the genesis to the rearmost transactions in blocks. Blockchain technology has introduced a new model of operation development primarily based on the successful perpetration of the data structure within the bitcoin operation. The abecedarian conception of the blockchain data structure is analogous to a linked list i.e. it's participated among all the bumps of the network where each knot keeps its original dupe of all the blocks (associated with the longest chain) starting from its birth block. Lately, numerous real- world operations have been developed in different disciplines, similar as the internet of effects, e-government and e-document operation. These operations influence benefits of blockchain technology due to its self- cryptographic confirmation structure among transactions (through hashes), and public vacuity of distributed tally of transactions- records in a peer- to- peer network. Creating a chain of blocks connected by cryptographic constructs(hashes) makes it veritably delicate to tamper the records, as it would bring the rework from the genesis to the rearmost transaction in blocks within the environment of blockchain- based traceability for pharmaceutical supply chain, presents one of the original sweats. Although our result has parallels with this trouble due to the focus on pharmaceutical supply chain as well as the use of blockchains, we take a holistic view of the pharmaceutical supply chain, presenting an end- to- end result for medicine traceability whereas only concentrated on a subset of these challenge.



PROPOSED METHODOLOGY

To design a framework FMD (Fake Medicine Detection) using Blockchain technology which is able of tracing medicines throughout the pharmaceutical supply chain in order to combat the problems of fake drugs.

Objectives of Proposed System

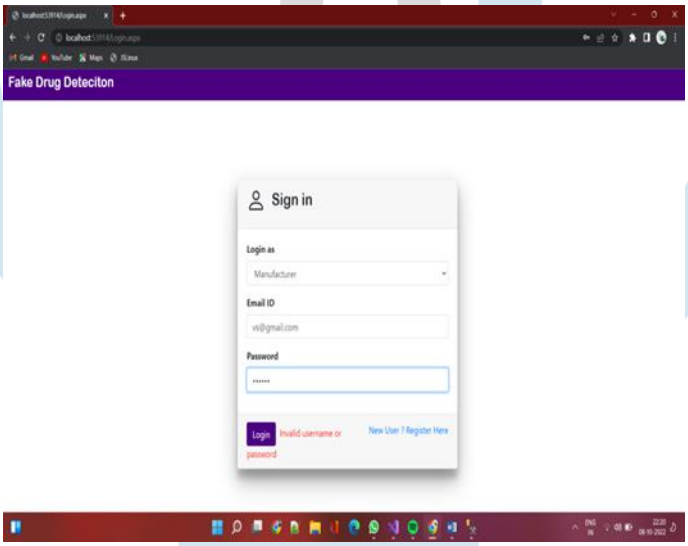
• Reduced falsification affiliated losses- FMD can maintain clear track and trace record of entire medicines trip from manufacturer to case. thus, discovery of fake medicines would come easy in the supply chain.

• The use of blockchain in the pharmaceutical supply chain can enable exact locales of drugs to be linked. It's possible to shoot or perform the batch monuments efficiently and snappily while maintaining increased patient health safety.

• The enhanced traceability facilitates the optimization of goods inflow and an effective system of stock operation.

Blockchain technology is largely able of keeping track of the medicine history throughout the pharmaceutical supply chain. Two important aspects that makes Blockchain data secure and safe are that the blocks are timestamped and inflexible timber tampering of information insolvable. Organizations can have either a public blockchain or a private bone

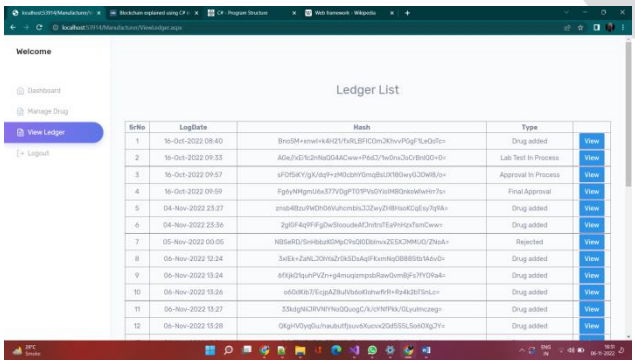
The associations will partake a distributed tally between the parties involved in the manufacture and distribution of the medicine on these blockchains. also, in these blockchains only limited access is handed which depends on the data participating contract among the two parties. With Blockchain we can keep complete track of the medicines beginning from manufacturers to end consumers. Every time the medicine peregrination from one reality to another, the data is stored on the block supply chain. This makes the traceability of medicines an easy task and therefore helps in combating fakes from the assiduity.

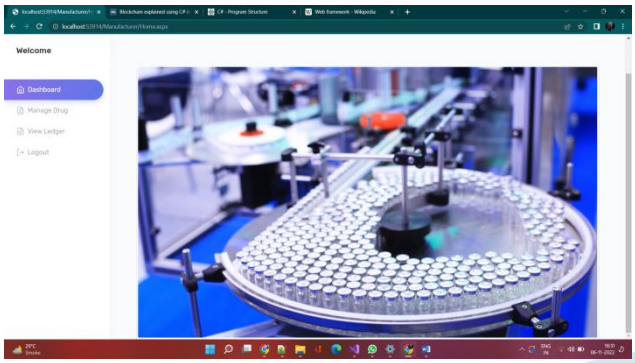


RESULTS

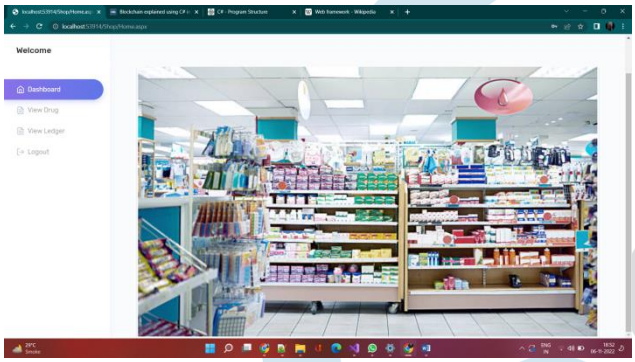
Login Page

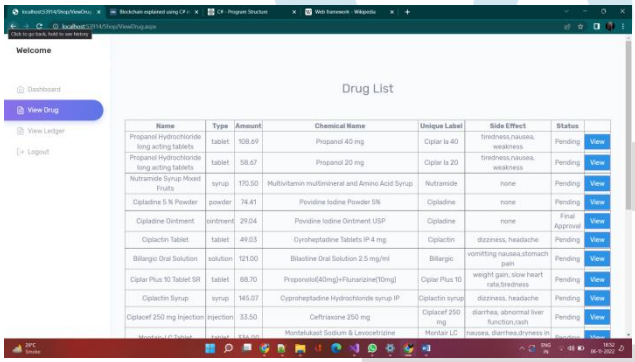
Manufacturer page:



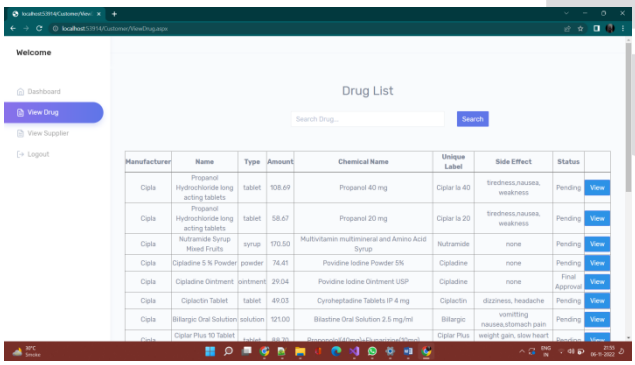


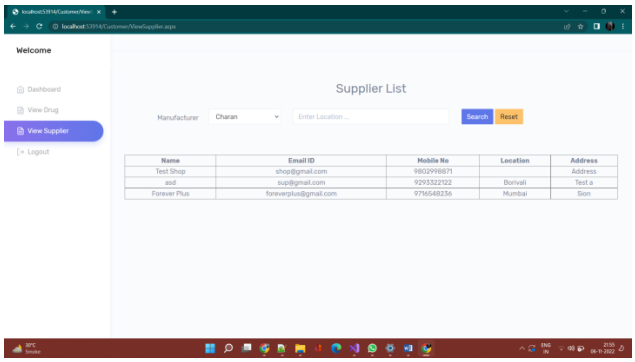
Supplier page:





Customer page:





FDA:

CONCLUSION

The proposed frame can give both manufacturer's authenticity as well as medicine security. The current methodologies for combating fake medicines works on third- party trust and therefore lacks in terms of security for the medicine safety. In comparison to these current methodologies, the proposed frame is grounded on Blockchain and is hence largely secure and able of dealing with the fake medicine's imminence.

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