International Engineering Journal For Research & Development
Vol.5
Issue 4

E-ISSN NO:-2349-0721

Impact factor : 6.193

TRACEABILITY AND DETECTION OF COUNTERFEIT MEDICINE SUPPLY CHAIN THROUGH BLOCKCHAIN

[1]Alok Kamble, [2]Nandini Chandane, [3]Rahul Shinde, [4]Kedar Khopade
Department of Computer Engineering, NBN Sinhgad School of Engineering[1, 2,3,4]

ABSTRACT

The production and distribution of fake medicine is a very big issue in developing countries. One of the reason for drugs fraud is the imperfect supply chain system in Pharmaceutical industries. In this chain drugs change from owner to customer and fake drugs added into this supply chain before it reach the customer. That's why distributer, customer and sometimes also owner and supplier don't know what happened with original products. With this developed system we have used block chain technology to add traceability, visibility and security in pharmaceutical industry. This system is used to track drugs from its manufacturing to the customer. After the uses of medicine its effect on patient have recorded to database for upcoming statistics. The important thing is that the only trusted parties are allowed to join this network and push data to block chain.

Keywords: **Block chain, counterfeiting, supply chain management, pharmaceutical industry, traceability, security.**

INTRODUCTION

Pharmaceutical Research and Development is an unpredictable procedure that takes quite a while from sedate revelation to tranquilize advancement and administrative endorsement. At the point when all the procedure is done and a standard item is created, the following test for makers is to convey the item to the expected client in its unique structure and to guarantee that the client get the real item that is created by the genuine producer, not by forger. In any case, the present Supply Chain Management (SCM) arrangement of pharmaceutical industry is obsolete, and doesn't give perceivability and control to producers and administrative authority over medications dissemination and it can't withstand the 21st century digital security dangers. This circumstance of SCM prompts the creation, circulation, and utilization of fake medications. Fake medications have made an especially perilous general wellbeing hazard and progressively sharp overall issue particularly in creating nations.

These fake medications straightforwardly and by implication antagonistically influence wellbeing. In a roundabout way, these medications don't contain the measurement or dynamic operator required to execute the sickness, that at long last reason tranquilize safe strains, and afterward in any event, utilizing the first medications are futile. All the more straightforwardly, such fakes may contain dynamic fixings, yet the sum is excessively low or excessively high, or created in an unclean way that contains poisonous fixings, for this situation it can cause intense medical issues. Fake medications makers now and again utilize the brand logo of genuine makers and make counterfeit items utilized in day by day life that is less destructive. Yet, much of the time they influence the medications for the treatment of disease, painkillers, cardiovascular disarranges, anti-toxins, contraceptives and other doctor prescribed medications that can prompt intense outcomes.

As indicated by the International Anti-Counterfeiting Coalition (IACC), forging has gotten one of worlds biggest and quickly developing criminal organizations, with an expected estimation of more than US$ 600 billion every year.

For the anticipation of fake medications, pharmaceutical industry needs a proficient gracefully chain the executives framework, and the best accessible answer for build up an ideal SCM framework is the Block-chain innovation. Square chain is a disseminate record framework (right off the bat presented by a pen name Nakamoto in 2008) that has indicated across the board versatility lately and an assortment of market areas looked for methods ofconsolidating its capacities into their tasks. Albeit, so far the vast majority of the emphasis has been on the budgetary administrations industry, yet now extends in other help related regions, for example, medicinal services, vitality and legitimate firms likewise began utilizing this wonder. Gracefully chain security is one viewpoint that has as of late won consideration. Any item subject to a delicate creation process and across the board reputational issues are related with the last item, the advantages of Block-chain are clear. Square chain is the best fit in those situations where protection assurance and information security is the most noteworthy need. In this way pharmaceutical gracefully chain presents a further use instance of Block-chain innovation.

RELATED WORK

Writing review is the most significant advance in any sort of research. Before begin creating we have to examine the past papers of our space which we are working and based on study we can foresee or produce the downside and begin working with the reference of past papers.

In this area, we quickly audit the related work on Traceability of the Counterfeit medications and their various methods.

With Gcoin blockchain, the administration model of the medication flexibly chain could move from controlling (just by government reviews) to reconnaissance net (by each member who includes the gracefully chain).[1]

In this system, the creator utilizes the web which is encouraging the exchange by furnishing forgers with a huge customer base and constrained dangers. The dim net inside it takes into consideration mysterious exchanges between producer, distributer and purchaser. While some online drug stores are authentic, there are a developing number of those that are unsubstantiated which sell hazardous fake items. Both the bundling and medicine are getting progressively modern, making it hard for shoppers and law authorization to recognize them without synthetic examination. Fake groups have additionally been recognized in built up legitimate exchange courses whereby they can, if undetected, end up in high road drug stores and emergency clinics. Various associations have set up overall activities to destroy the exchange anyway this is a complex and advancing issue that without critical changes to enactment may never be fully.[2]

In the system, the author developed a clinical information sharing and security plot dependent on the Hospital's private blockchain to improve the electronic wellbeing arrangement of the medical clinic. Right off the bat, the plan can fulfill different security properties, for example, decentralization, transparency, and alter opposition. A dependable instrument is made for the specialists to store clinical information or access the chronicled information of patients while meeting security safeguarding. Moreover, an indications coordinating component is given between patients. It permits patients who get similar manifestations to direct shared confirmation and make a meeting key for their future correspondence about the ailment. The proposed plot is actualized by utilizing PBC and OpenSSL libraries. At long last, the security and execution assessment of the proposed conspire is given.[3]

In this system, the developer portrays about the Blockchain that offers various open doors for utilization in the medicinal services division, for example in general wellbeing the executives, client arranged clinical research dependent on close to home patient information just as medication duplicating. The huge capability of this innovation shows up any place, as of not long ago, a believed outsider was fundamental for the settlement of market administrations. With Blockchain, direct exchanges abruptly become conceivable, whereby a focal entertainer, who controlled the information, earned commission or even mediated in a blue penciling design, can be eliminated.[9]

DEVELOPED METHODS

The blockchain is helpful in monitoring the whole assembling chain of the medication. Each new exchanges added to a square is changeless and time stepped which implies that the data can't be messed with. Organizations can either have an open or a private blockchain. On these blockchain, the organizations can have a circulated record shared among the gatherings engaged with the assembling and conveyance of the medication. In addition, get to is just constrained relying upon data sharing agreement between the two gatherings. Through blockchain, we can get the total path of the medication. Each time the medication moves from an element to another, the data is put away on the blockchain which makes it simple to follow the medication and wipe off fakes from the racks. Therefore the blockchain innovation will help with two primary issues: first, it will permit organizations to follow their items down the flexibly chain, making an impenetrable circuit, impermeable to fake items. Second, it will likewise permit partners, and particularly labs, to make a move a posteriori if there should be an occurrence of an issue by recognizing the specific area of their medications.

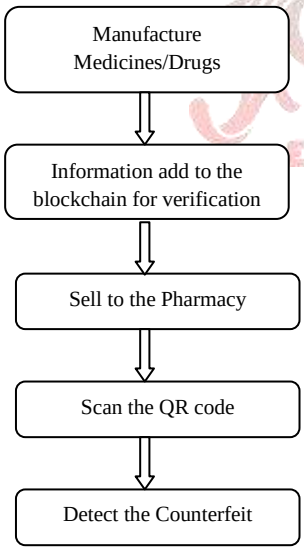


Fig.1 Flow diagram

DEVELOPED ARCHITECTURE

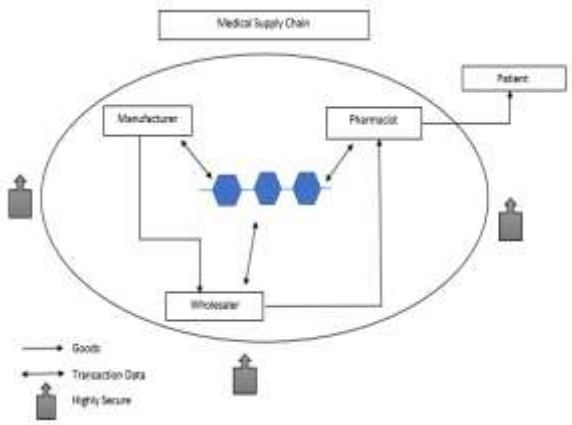
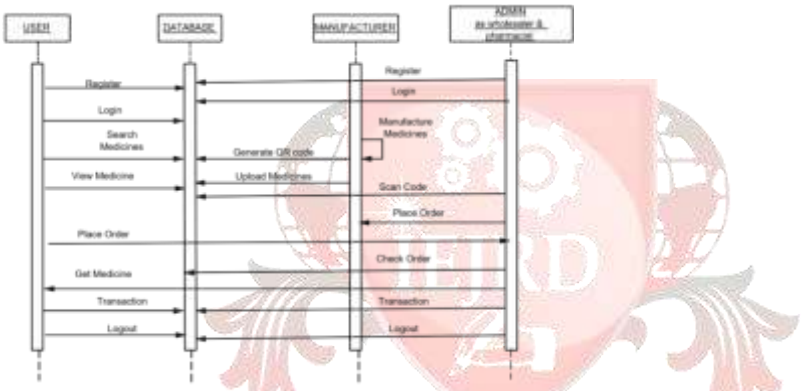


Fig.2 System Architecture

ACTIVITY DIAGRAM



RESULTS

Homepage

Product details

QR code generate

QR code(Drugs) verification

Users

3.3Module Description-

User Interfaces

Registration();

Login();

View Medicines();

Place Order();

Transaction()

Logout();

Manufacturer Interfaces

Registration();

Login();

Manufacture Medicines()

Generate QR code()

Transaction()

Logout();

Wholesaler/Retailer Interface:

Register();

Login();

View Medicines()

Scan code()

Place Order()

Transaction()

Logout();

ALGORITHM DETAILS

Advanced Encryption Standard

- Nowdays more popular encrypt algo. is Advan Encrypt Stand (AES). It is very fast.
- key size of DES is too small so used AES algorithm for Encryption. To overcome the vulnerable risk against Tripple DES was invent but it was found slow.

The features of AES are as follows −

- It has Symmetric key symmetric block cipher
- Uses 128-bit data and 128/192/256-bit keys
- AES is best than DES
- It requires only one key for encryption and decryption

MATHEMATICAL MODELING

- Let us consider S as a system for Traceable of counterfeit medicine supply chain through Block-chain.
  - S=
  - INPUT:
  - Identify the inputs
  - F= f1, f2, f3 ....., FN— F as set of functions to effect commands.
  - I= i1, i2, i3—I sets of inputs to the function set
  - O= o1, o2, o3.—O Set of outputs from the function sets,
  - S= I, F, O
  - I = file uploaded by the user
  - O = Output i.e. fake medicine detection.
  - F = Functions implemented to get the output

- **Space complexity:**
- The space complexity depends on Presentation and visualization of discovered patterns.
- More the storage of data more is the space complexity.
- **Time complexity:**
- Check No. of patterns available in the datasets= n
- If (n(1)) then retrieving of information can be time consuming. So the time difficulty of this algorithm is O (nˆn).
    - = Failures and Success conditions.
- **Failures:**
    - 1. Huge database can lead to more time consumption to get the information.
    - 2. Hardware failure.
    - 3. Software failure.
- **Success:**
    - 1. Search the required information from available in Datasets.
    - 2. User gets result very fast according to their needs.

OUT COME AND CONSIDER

In this assurance we are aim to recognize the fake medication flexibly chain through Blockchain. Tests are finished by a PC with an arrangement: Intel (R) Core (TM) i5-6700HQ CPU @ 2.60GHz, 16GB memory, Windows 7, MySQl Server 5.1 and Jdk 1.8. In our structure, We examine the developed and existing structure. The general exactness of developed method is upgraded when contrasted with existing policies. So our proposed structure exactness is better to existing framework. So this works gives better outcomes as contrast with existing policy.

CONCLUSION

This system is used for the detect fake medicine supply by using blockchain technology. Using this system the blockchain healthcare supply chain can enable pharmaceutical manufacturers to identify defective drugs before they enter supply chains. The entire system ensures to keep fraud drugs out of medical supply chains and smooth the entire process.

REFERENCES

1. Jen-Hung Tseng, Yen-Chih Liao, Bin Chong and Shih-wei Liao, “Governance on the Drug Supply Chain via Gcoin Blockchain”, International Journal of Environment Research and Public Health, MDPI, 2018.
2. Andrew O’Hagan, April Garlington, “Counterfeit drugs and the online pharmaceutical trade, a threat to public safety”, Forensic Research & Criminology International Journal, Volume 6 Issue 3 – 2018.
3. Xiaoguang Liu, Ziqing Wang, ChunhuaJin, Fagen Li, And Gaoping Li, “A Blockchain-based Medical Data Sharing and Protection Scheme”, IEEE Access (Volume: 7), 2019.
4. YounessTribis, Abdelali El Bouchti, Houssine Bouayad, “Supply Chain Management based on Blockchain: A Systematic Mapping Study”, MATEC Web of Conferences (2018).

5. Jiafu Wan, Jiapeng Li, Muhammad Imran, Di Li, Fazal-e-Amin, “A Blockchain-Based Solution for Enhancing Security and Privacy in Smart Factory”,IEEE Transactions on Industrial Informatics Volume: 15 , June 2019.
6. Chi Harold Liu, Senior Member, IEEE, Qiuxia Lin, Shilin Wen. “Blockchain-enabled Data Collection and Sharing for Industrial IoT with Deep Reinforcement Learning”, IEEE Transaction on Industrial Volume: 15, Issue: 6 , June 2019.
7. X. Qi, B. S. Emmanuel, O. Kwame, G. Jianbin, D. Xiaojiang And G. Mohsen, "MeDShare: Trust-Less Medical Data Sharing Among Cloud Service Providers via Blockchain," IEEE Access, 2017.
8. Asaph, E. Ariel, V. Thiago and L. Andrew, "MedRec: Using Blockchain for Medical Data Access and Permission Management," in 2nd International Conference on Open and Big Data, Cambridge, MA, 02139, USA, 2016.
9. M. Mettler, "Blockchain Technology in Healthcare: The Rovolution Starts Here," in IEEE 18th International 12 Conference on e-Health Networking, Applications and Services, Healthcom, 2016.
10. C. Edward, L. Ying, Z. Jia and L. Yang, "Healthcare services across China – on implementing an extensible universally unique patient identifier system," International Journal of Healthcare Management , pp. 1-7, 2017.