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Swasthya Mitra: Application of Blockchai in Medical Sector

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Abstract: The relationship between Technology and Human Health isn't new concept. Over the years healthcare sector is encountering flurry of issues such as data in consistency, v.i.z, lack of proper system for data management and maintainance. According to a research by WHO, the trade of counterfeit medicines raised by 40% as the global supply chain got deeply affected with it.Covid-19 has exposed scores of problems encountered by the healthcare sector. People were afflicted with the problems in the healthcare domain. Scores of people weren't able to get timely treatment which led to unfortunate and untimely casualties. The rationale was lack of data, v.i.z, History of patients data.

All these eventually created a havoc in the world of Healthcare. In order to handle these issues, Swasthya Mitra - an Ethereum based Blockchain Dapp , which eventually fixes the appointment with the doctors. Due to lockdown, many weren't able to go to the hospitals. Over the years , counterfeit tablets are also one of the concern in the Healthcare domain. It's high time to rethink, revamp and renew the global supply chain management. It consists of Supply Chain management system which makes it possible to track the supply of tablets or drugs in order to curb the trade of counterfeit tablets.Supply Shocks rippled around the world. Due to the ongoing pandemic of Covid-19 , the supply chain sector was one of the worst affected. It led to the tremors of lack of supply of medicines and medicinal products .Since the supply of the medicines was less, Demand Shocks surged.

As the lockdown deepened, the Lack of supply chain, the shortage of stuff came and eventually the demand shock started hitting hovering each and everyone. This resulted in the aftershocks. However, the situation has improved but people are still enduring the agony of the covid-19, resulting in the bullwhip effect.

Keywords: Ethereum, Blockchain, Healthcare, Covid-19

1. Introduction:

Through this paper, it's reflected that people are living and leading in a world where there's no privacy. With the advent and advancement of technology, Blockchain has also spread its wings across all domains and spheres of life. The blockchain is a distributed database of records of all transactions or digital event that have been executed and shared among participating parties. Blockchain Technology is an open distributed ledger in which transaction takes place between two parties. Blockchain Technology has been unleashed and uncovered by an unknown person or a group of people in the year of 2008 when it witnessed an exponential growth

1.1 Challenges:

Problems with currently used system is majority of the hospitals uses Centralised Servers. There's always an opportunity for security threat or breach. Third party server crystal clearly makes the whole system complex as it involves need to third party for verification and execution of Transaction make the process complex. Time is another factor. It takes long span of time for transaction, particularly for transaction across borders. These are substantial challenges in the healthcare sector.

At the end of the day , money is what changes the game in the healthcare domain as patient wants medical faclilities to be at optimum rate. Blockchain network reduces expenses in several ways. No need for third-party verification. So, Swathya Mitra is cost effective. Participants can share assets directly. Intermediaries are reduced.

Other substantial challenges are that data is stored in a fragmented way. There's no organised Workflow for storing the data. The data is stored in a centralised fashion. In the world of Internet, there's no privacy stating that the data might be leaked or hacked. Another challenge is that there's an ambit for the supply chain sector to engage in transferring of counterfeit medicines. Covid-19 has exposed the vulnerabilities in the healthcare industry .

1.2 How It Solves

The most significant demand of the customers is the privacy and security. Blockchain networks tightens the security as it works on the principle of Encryption-Decryption and Hashing. Hashing implies each mode consists of a key-value pair and every next node has a key of previous node .Crptography lays another layer of protection for users. So it's way better in terms of safety, security and surveillance.

Essentially, Consensus is a decision making process for the group of network active on the blockchain network. It becomes really handy when millions and billions of nodes are validating a transaction as it makes a decision quickly.

All relevant network participants must agree that a transaction is valid. This is achieved through the use of consensus algorithms.

Swasthya Mitra is an Electronic medical record Dapp which is highly critical and crucial in terms of maintaining records of the patients, hospitals stuff and moreover it apparently gives the medical history of the patients which is required for the further treatment. Swasthya Mitra provides a shared, immutable and transparent history of all the transactions to build applications with trust, accountability and transparency. Through this paper, it has been strived to create Smart Contracts for automatic interaction between doctors and Patients

The proposed methodology can significantly make the doctor-patients relationship more reliable, secure and transparent. Medical Records are highly critical and crucial in terms of further diagnosis, patients privacy and confidentiality which is essentially shared between among healthcare providers, patients and Doctors. The vulnerability of maintaining the records in the domain of medical sector was apparently visible and exposed during the covid-19 scenario. Both the parties tend to lose the data. Interoperability is one of the reason why there is the data inconsistency among the two parties: patients and healthcare providers. Generally, old people who are inflicted with multiple and fatal diseases such as cancer, etc has to maintain long history and up-to-date information.

According to the research, there's 50% of the counterfeit medicines. It takes the life of about% of the people.

Around 80% of the death occurs in the World because of the It's essentially and effectively a supply chain management system wherein you track the exact location of the medicine's or the tablets.

2. Literature Survey

Table 1: [Name]

Author	Technique Used	Finding	Accuracy
AsaphAzaria; Ariel Ekblaw; Thiago Vieira; Andrew Lippman	Blockchain	Using Blockchain for Medical Data Access and Permission Management	79%
AlevtinaDubovitskaya, MS,[1,2] ZhigangXu, MD,[3] Samuel Ryu, MD,[3] Michael Schumacher, PhD,[1] and Fusheng Wang, PhD[4]	Blockchain	Electronic Medical Records Sharing using Blockchain	90%
R. Elhassan, F. Sharif, T.I. Yousif	Telemedicine	Paradigm shift in the mindset of people	97%

R. Elhassan, F. Sharif, T.I. Yousif	Ethereum	Decentralised Server	88%
A Hoerbst, E Ammenwerth	Electronic Healthcare Record using Blockchain	Digitalised Record System	94%

Swasthya Mitrais actually a Decentralised App[1] which is a part of Blockchain [2] whose application is being leveraged in the Healthcare domain.

With time, things change and change is the only constant and same applies in the world of healthcare sector.

One of the approach which was followed over the years in the healthcare sector manual way of storing data wherein patients used to get their prescription, medical reports. Digitalization [3] came and people began to use Technological stuff for the same. However, there were flurry of drawbacks encountered, particularly with security, cost etc. A decentralised app was an appropriate solution to it

One of the approach which was followed before the pandemic of Covid-19[4] , traditional medical system wherein patients were supposed to go to the hospital for the diagnosis of ailments.

Traditional healthcare system [5] refers to the same set of protocols followed over the years wherein people go to the hospitals, fix an appointment with the doctors and eventually get medicines or so.

However, modern healthcare system is essentially a superset of Telemedicine which skirts around digital stuff such as video calls , e-mails, integrating groundbreaking Technologies such as Artificial Intelligence6], Blockchain [7] etc for treatment, advice, consultation and henceforth, improving and upgrading the quality of life. Counterfeit8] tablets or medicines was the biggest concern in the healthcare domain. With SwasthyaMitra , all the problems were combated.

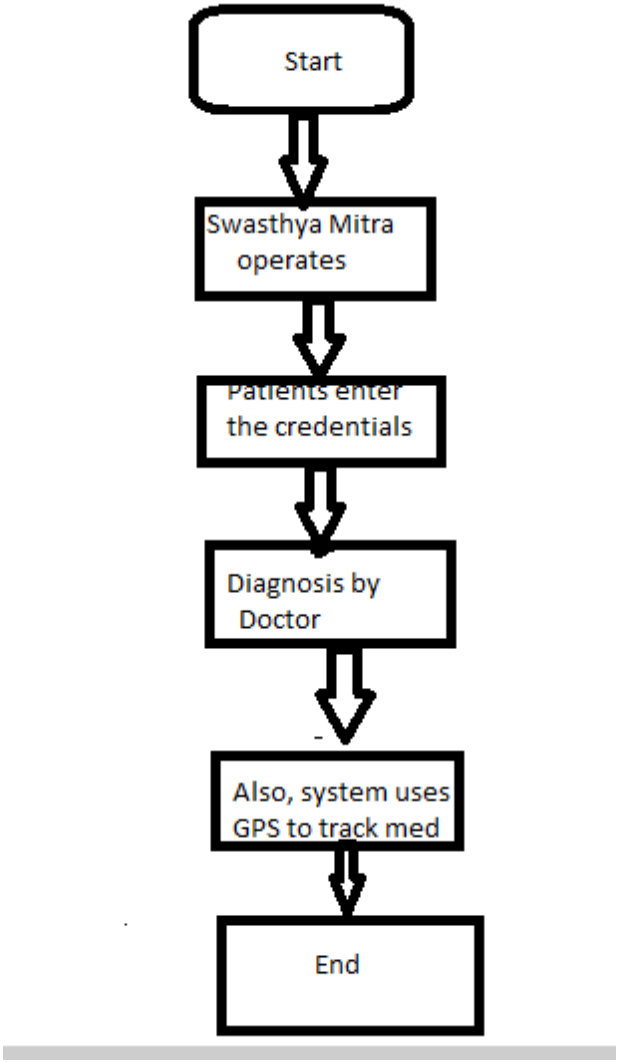
Ethereum[9] is a decentralized open source blockchain featuring smart contract functionality using Solidity[10] language.

3. Proposed Methodology:

While designing Swasthya Mitra to combat these issues, patients priority must be at the top, essentially the problems encountered by them should be solved. This is significant for ensuring trust, reliability and accountability to the patients on behalf of the healthcare providers who are worried about their confidentiality and the retrieval of their medical data. Eventually trust and reliability builds when the problem encountered by both the parties is handle, henceforth through this paper, model has taken care of record-onboarding exceptions. Supply chain management system helps in tracking the location of the the tablets. Features it contains are the time at which the medicine was exported, date of manufacturing, timestamp, location where has to go and came from etc. It induces a sense of reliability, Transparency and efficiency in the supply management chain. In this paper, it's reflected something known as Automated interaction between Doctors and Patients. Due to the ongoing Covid-19, Social distancing was imposed everywhere.

According to a prominent research, majority of the people who were suffering from multiple diseases were unable to go the hospital for the treatment. It essentially killed many There will be many features to it such as Rating system. Key features includes it can't be tampered much.

3.1 Implementation:



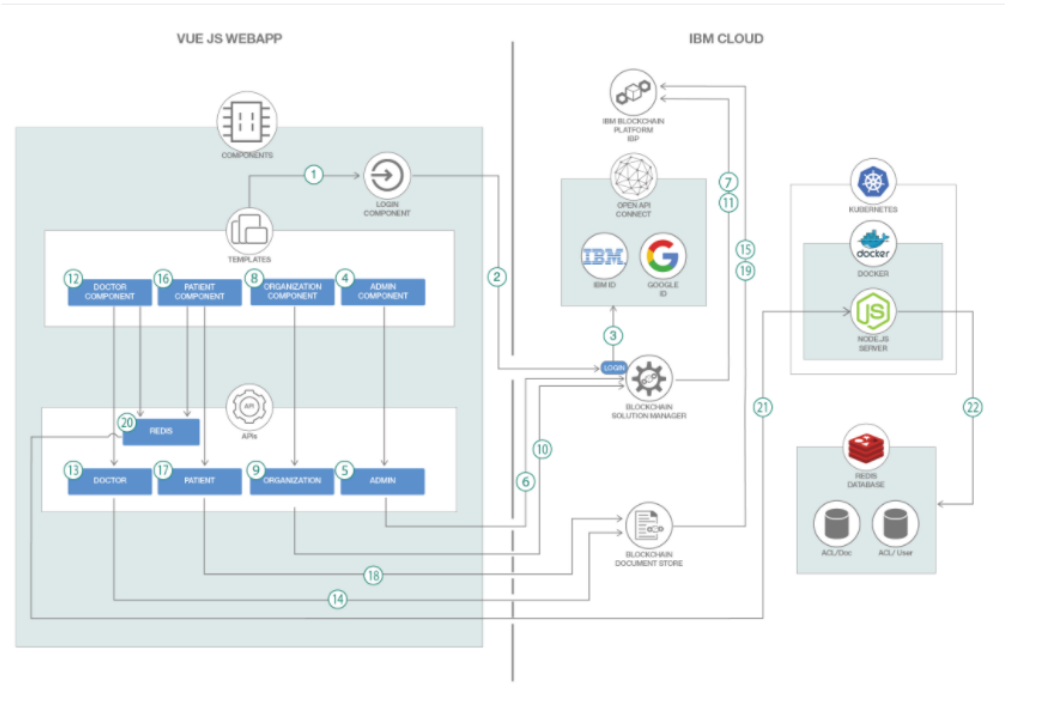
First and Foremost, the system operates. Patients enter the symptoms which they're inflicted with. As soon as patients enter the symptoms which they are afflicted with , with the aid and assistance of Machine Learning or Deep Learning , automated Doctors suggestions will come. Timestamp data type is effectively used in other to evade the inconvenience. The appointment will be fixed automatically using machine learning algorithms.

The node in the Blockchain network consists of doctors with specialisation in their field. Doctors suggestions will come along with the rating so that patients can chose.

Recommendation system will be used here. If doctors in the node are engaged with other patients, a time will be allotted for the patients wherein the appointment will be fixed later with the convenient consent of doctors and patients. All the data between doctors and patients such as prescription, medical reports etc will be stored in the blockchain based medical record system. Everything will be preserved. Data acquired from the customers through blockchain infrastructure can be used to create marketing automation through AI. Hospital management system will be consisting of login authentication. As and when the person enters the respective credentials. Swasthya Mitra takes it and fixes the appointment. The patients can share their grievances or the symptoms of the disease they are inflicted with. The doctor will take note of the symptoms articulated by the patients and will say if the patient needs to come to the hospital or not. Swashtya Mitra will also act as a supply management system wherein the counterfeit medicines will be able to trace and track the road through the map of the product. It will be able to lay hold of countrifiet stuff as it consists of product name, product costs, products reviews and product owners etc. It will traverse through the whole stuff and reveal. Each product will have unique id. Tracing and Transfer of product will be done easily. Swashtya Mitra consists of design friendly dashboard. Ethereum based Smart Contract is what enables and executes the workflow of Swasthya Mitra

model. It's legal provisions has been formalized in the source code. All the respective processes take place due to the presence of Smart Contract. All networks are connected peer-reviewed in a reliable manner.

4. Result & Discussion



To augment this event, Blockchain would likely not completely replace the current system but act more so as a supplemental vehicle. Blockchain will be very much suited in the supply chain management or tribulations, medication management etc. Working towards a large scale medical record-keeping repository is goal Swasthya Mitra. However, obtaining multiple small wins with "low hanging fruit" will allow enough momentum to be created for a national push on regulation and private sector parties to improve our national record keeping system. Healthcare is a data intensive domain where large amount of data is created, dissemination, stored and accessed. It will essentially and significantly enhance the patients care system. Data is generally lost or mishandled, so in order to make it safe , secure and keep the data , Swasthya Mitra extends it's aid. Privacy, Security and Integrity is critical and crucial. In order to make such a system as proposed in this paper, it is critical and crucial to get consent from patients as well as Doctors. This essentially helps in management and maintainance of the database. But the disadvantage of anyone can change it . Moreover the data is purely and totally scattered. Anyone can lose the confidential and significant document, say important patient reports and prescriptions. Database will have CRUD option. The demand for multiple access from users and health providers have also raised the issues of security, interoperability, and privacy of the data. The whole record system is fragmented. The fulcrum of Blockchain lies distributed ledger that is collectively Safety, Integrity and Reliability will be addressed using Swasthya Mitra. This essentially helps in management and maintained of the database. But the disadvantage of anyone can change it . Moreover the data is purely and totally scattered. Anyone can lose the confidential and significant document, say important patient reports and prescriptions. Database will have CRUD option which can perform Create, Read, Update and Delete operation
The demand for multiple access from users and health providers have also raised the issues of security, interoperability, and privacy of the data

5. Conclusion

Healthcare domain has emerged as one of the most preferred use cases of IoT and its related technologies. However, its widespread adoption is still a distant dream. The primary reason behind this is the security and privacy of the data and the participating entities. To overcome this, blockchain technology has emerged as a convenient means to improve the security and privacy of the data and its users. There are flurry of ways in which the healthcare industry stores, shares and retrieves data. Effectively,

A retrospective analytical survey glares that data inconsistency, lack of proper system, lack of transparency and accountability results in the creation of our resulted in serious repercussions Blockchain based

Ethereum Smart contract .With an innovative and creative solution of "Swastra Mitra" where Doctor-Patients appointment will be done with automation. With the aid and assistance of Machine Learning, the specialised DR's name is popped up. It will handy at times when contact spreading diseases or pandemics such as Covid-19 is there. The proposed methodology also includes medical record System which help in maintaining and management of Medical Records. It will be handy for both medical practitioners a as well as for patients Hence.

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