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CS-310/ Study.com

4/14/2023

Blockchain technology can be useful for protecting electronic medical records.

Blockchain technology is not limited to the financial sector that deals with cryptocurrency transactions. It is a concept of cryptography that has long been a cornerstone of data privacy within the computer science sector. Furthermore, another field that could benefit from the proper utilization of blockchain technology is health science, where privacy is of utmost importance to comply with ethical standards and protocols such as the HIPAA Act. The health information and medical history of a patient are kept in digital files called electronic medical records (EMRs). Because they are far more effective than traditional paper records and make it simple for healthcare practitioners to share and access information, EMRs are growing in popularity in the healthcare sector. Nevertheless, security flaws in EMR like hacking or unauthorized access can lead to the theft or misuse of confidential patient data. Blockchain technology, offering a safe and secure mechanism to store and share EMRs, may be capable of addressing these security concerns. This essay will examine how electronic medical records can be protected by utilizing blockchain technology.

In 2008, As a response to the Great Recession, which was characterized by the collapse of the American financial system and the failure of large banks that had control over people's money, blockchain technology was created by an entity known as Satoshi Nakamoto. The concept of blockchain is to offer a decentralized, distributed ledger that records transactions via encryption. With the use of blockchain technology, transactions can be recorded securely and remotely. The cryptographic hash of each block, which can be found in every block, serves as a security and integrity guarantee for the chain. Once a block gets added to the chain, it cannot be deleted or modified, resulting in a visible and unalterable record of transactions. Furthermore, each block in the blockchain can be used to verify the accuracy of transactions and ensure the security of the data it contains. Most people only know about blockchain technology after it made a huge hit on the financial sector with the introduction of a new type of currency known as cryptocurrency. Since then, we have explored the possibility of utilizing blockchain technology in the most useful way such as using it in non-fungible tokens (NFTs), which include but not limited to picture, drawing, video, artwork, etc. Let’s look at how the blockchain technology is applied in NFTs usage before examining its use for EMRs.

In NFTs, blockchain technology uses its properties to check and verify to identify ownership and authenticity of the digital assets. Additionally, block chain is not just check and verify the NFTs, it also provides a secure protection, help the work from getting alter, utilize smart contract to ensure the term are met before transaction take place. Lastly, the decentralized network provided redundancy of data is another backup within block chain technology in which it will make multiples copies of the same information and distributed to various network, location, which prevent the one party from controlling the data.

All these benefits will be similarly utilized and inherited with Electronic Medical Records if powered by blockchain technology. However, there obviously are going to be many revisions and supervision to tailor it for it to work well with the demand of the health care sector. First, the blockchain technology being implemented needs to be defined on where the information will be stored. This will help the confidential information of patients such as health record, diagnosis, treatment, information is fully protected in a safe location since the blockchain technology involve in making copies of the information for check against any alteration. It needs to be saved in a trusted location with only authorized personnel having the “key” to access this information. Second, the implementation of this technology needs to be supervised and monitored by a technical specialist such as cyber security analyst or software developer to ensure the synchronization of the blockchain and EMRs work correctly as expected. Lastly, the medical providers that will utilize blockchain technology in EMRs need to be educated about the technology as well as how to protect the data and utilize it correctly. Blockchain technology used advanced encryption methods and decentralization to secure data, making it difficult for hackers to access or tamper with the data. However, the scary thing about blockchain is that it is almost inaccessible and impossible to access without the correct key and it could become a disaster if the key to access patient data is lost. Therefore, it is recommended that the person with access to the key keep it safe and should make the copy held by at least 2 people. The paper copy of patient records could be used as a form of back up as well in case the electronic system is down.

How would the blockchain-based EMR system store patient information? What is the process? Based on how its function, each patient's medical record would be stored as a block in the chain. Then, each of the blocks would be encrypted with Advanced Encryption Standard (AES) such as SHA-256, SHA-384, etc. Encryption via AES is very important because AES turns the plain text data into sophisticated code with either 128, 192, or 256 bits. The block size that would be used in healthcare information should be 256 for the maximum protection. The amount of time and the difficulty it is to decrypt a 256 vs 128 is exponentially different, not double or half as many would assume. Without knowing the key or other method of knowing majority of the key information, it would take thousand if not million of years to use a computer to crack the code from an AES. Additionally, each block would be linked to the previous block in the chain, this will check for any change in the current block and compare it with the previous block for data integrity. Thus, the process created a secure and tamper-proof method for storing and sharing patient data, unauthorized access, and reducing the risk of data manipulation or breaches.

Another benefit of blockchain technology for safeguarding EMRs is the capacity of blockchain technology to promote interoperability across various healthcare providers and systems. At of current, it can be difficult to transfer patient data between healthcare providers since so many of them utilize multiple EMR systems. This may result in ineffectiveness, therapy delays, and potential care mistakes. Blockchain technology is an excellent solution since it will be able to help address these interoperability challenges by providing a secure and decentralized method for sharing patient data across various systems. As mentioned, each block in the blockchain would contain a patient's complete medical history, including diagnoses, treatments, medications, and other information that would be relevant to the patient’s treatment. Then, the healthcare providers can access and share patient data securely and efficiently via the blockchain route, leading to improved care coordination, patient treatment quality, and faster service overall.

Blockchain technology is already being used by several businesses to protect EMRs. A good example is the UK-based startup medical chain, which has created a blockchain-based network for the efficient and secure sharing of patient data. Patients can choose which healthcare providers and for what purposes they want access to their data through the medical chain platform, controlling who has access to their medical records. Additionally, the platform enables safe and effective data exchange between healthcare providers, which enhances care coordination and results. (Blockchain Technology in Healthcare: A Systematic Review, 56). The main take away from this is that the UK start up is making use of the blockchain technology to quickly improve the access to patient information securely and easily.

Another example is a study conducted in Shanghai Public Health Clinical Center, the blockchain-based EMR system allows doctors to gather patient information quickly, securely, tamper-proof manner, and can perform diagnosis of HIV/AIDS efficiently. This helps to reduce the risk of transmission (Securing electronic medical records using blockchain technology, 43). The benefits here are easy access and the security of information that block chain can provide which have saved the medical care provider time from locking up patient in a cabinet or inside the doctor computer. This in term improves the quality of care for the patient in this study group.

In conclusion, the idea of blockchain technology is a fascinating advancement in the healthcare sector that has the potential to have a big impact on both patients and healthcare professionals. The advance encryption and the readily access to information from anywhere benefit both the health care provider and the patient in that the health care provider can quickly and securely provide treatment to patients from reviewing their record from anywhere. The patients will be able to control their information and provide it to whoever they want to know about their information to receive care instead of waiting for the hospital to transfer their medical record which could take days if not weeks. Moreover, integrating Blockchain technology into electronic medical records will help to increase patient data security and privacy and making it a useful tool for safeguarding electronic medical records.

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